FINAL

ENVIRONMENTAL ASSESSMENT

DEMOLITION OF THE ALTITUDE WIND TUNNEL COMPLEX AND PROPULSION SYSTEMS LABORATORY (TEST CELLS 1 & 2) AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GLENN RESEARCH CENTER

National Aeronautics and Space Administration
Glenn Research Center
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ENVIRONMENTAL ASSESSMENT FOR THE DEMOLITION OF THE ALTITUDE WIND TUNNEL COMPLEX AND PROPULSION SYSTEMS LABORATORY (TEST CELLS 1 & 2) AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GLENN RESEARCH CENTER (CLEVELAND, OHIO)

Lead Agency: National Aeronautics and Space Administration (NASA) Glenn Research Center (GRC)

Proposed Action: NASA's Proposed Action is to demolish the Altitude Wind Tunnel (AWT) Complex and Propulsion Systems Laboratory (PSL) (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at GRC. Activities include the salvaging and recycling of materials, wastes, and equipment where feasible, with waste minimization efforts utilized. It is expected that the Proposed Action would begin during calendar year 2007.

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Date: January 2007

Abstract: This Environment Assessment (EA) has been prepared by NASA in accordance with the National Environmental Policy Act of 1969, as amended, to assist in the decision-making process for the demolition of the AWT Complex and PSL (Test Cells 1 & 2) at GRC. This EA addresses the potential historic and environmental impacts associated with the Proposed Action and the No-Action Alternative. In general, the GRC has no further need for the AWT Complex and PSL (Test Cells 1 & 2). Both facilities are outdated and well beyond their expected and useful lives. In addition, the facilities are deteriorating and require significant maintenance. Demolishing the AWT and PSL buildings would reduce GRC's future maintenance costs for these facilities and provide real estate for future use. The eligibility of these facilities for National Register of Historic Places (NRHP) listing has not been officially determined by the Ohio Historic Preservation Office, however NASA believes the buildings to be eligible for listing. Early consultation with the Ohio Historic Preservation Office and GRC's Facilities Preservation Officer indicate that the facilities are eligible for NRHP listing. An agreement document such as a Memorandum of Agreement (MOA) would be developed between NASA GRC and the Ohio Historic Preservation Office that would specify the mitigation measures required if they are determined eligible for listing in the NRHP. No public comments were received on this EA.

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EXECUTIVE SUMMARY

The National Aeronautics and Space Administration (NASA) Glenn Research Center (GRC) is proposing to demolish the Altitude Wind Tunnel (AWT) Complex and Propulsion Systems Laboratory (PSL) (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at the GRC in Cleveland, Ohio. The GRC has no further need for either facility to support NASA's mission and is proposing to demolish the facilities to eliminate deferred maintenance and provide real estate for future use.

The *Demolition of the Altitude Wind Tunnel Complex and Propulsion Systems Laboratory (Test Cells 1 & 2) at the National Aeronautics and Space Administration Glenn Research Center Environmental Assessment* has been prepared by NASA to assist in the decision-making process in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §4321 *et seq.*); Council on Environmental Quality Regulations for implementing the procedural provisions of NEPA (40 CFR parts 1500–1508); and NASA's NEPA policy and procedures (14 CFR subpart 1216.3). This Environmental Assessment considers the historic and environmental impacts associated with the Proposed Action and the No-Action Alternative. No final action will be taken on this proposal until the decision-making process under NEPA has been completed. Demolition would not begin until all Federal, State, and local permits and approvals have been obtained.

Environmental impacts from implementing the Proposed Action were evaluated and no significant impacts were identified in the areas of land use, air quality, water quality, geology and soils, natural resources (including threatened and endangered species), socioeconomics, hazardous materials handling and waste disposal, transportation, Environmental Justice and cumulative effects. The principal area of potential environmental impact addressed in this EA involves the historic nature of the AWT Complex and PSL (Test Cells 1 & 2). Both facilities are considered unique historic properties and their value is recognized as contributing elements to the proposed GRC Central Area historic district that may be eligible for individual listing in the National Register of Historic Places (NRHP). While the proposed demolition would impact the NASA GRC's cultural resources and result in a loss of the facilities, the history of the structures would be retained through mitigation measures developed in consultation with the Ohio Historic Preservation Office (see Chapter 5 of this EA for representative mitigation measures for cultural resources). If necessary, additional mitigation measures would be developed to preserve the history of the facilities and mitigate the effects of demolition upon the proposed historic district in consultation with the GRC Facilities Preservation Officer and the Ohio Historic Preservation Officer. The status (eligibility and final NRHP listing) of the facilities and the historic district has not been officially determined by the Ohio Historic Preservation Office. However, early discussions between the Ohio Historic Preservation Office and the GRC Historic Preservation Officer indicate that the facilities are eligible for listing in the National Register of Historic Places. An agreement document such as a Memorandum of Agreement (MOA) would be developed between NASA GRC and the Ohio Historic Preservation Office that would specify the mitigation measures required to mitigate adverse effect to the properties, if they are determined eligible for listing in the NRHP..

Under the No-Action Alternative, the AWT Complex and PSL (Test Cells 1 & 2) would not be demolished, and the historical value of the properties would be retained in physical form, including their value as contributing elements to the proposed GRC Central Area historic district. However, the No-Action Alternative would result in indefinite maintenance with increasing costs for the AWT Complex and PSL (Test Cells 1 & 2) and would restrict real estate for future use. In addition, the NASA's continuing neglect would have an adverse effect with continued deterioration.

The EA was made available for public review. No public comments were received on this EA.

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COMMON METRIC/BRITISH SYSTEM EQUIVALENTS

Length

1 centimeter (cm) = 0.3937 inch (in)	1 in = 2.54 cm
1 centimeter = 0.0328 foot (ft)	1 ft = 30.48 cm
1 meter (m) = 3.2808 feet	1 ft = 0.3048 m
1 meter = 0.0006 mile (mi)	1 mi = 1609.3440 m
1 kilometer (km) = 0.6214 mile	1 mi = 1.6093 km
1 kilometer = 0.53996 nautical mile (nmi)	1 nmi = 1.8520 km
1 mi = 0.87 nmi	1 nmi = 1.15 mi

Area

1 square centimeter (cm^2) = 0.1550 square inch (in^2)	1 in^2 = 6.4516 cm^2
1 square meter (m^2) = 10.7639 square feet (ft^2)	1 ft^2 = 0.09290 m^2
1 square kilometer (km^2) = 0.3861 square mile (mi^2)	1 mi^2= 2.5900 km^2
1 cubic kilometer (km^3) = 0.2399 cubic mile (mi^3)	1 mi^3= 4.1681 km^3
1 hectare (ha) = 2.4710 acres (ac)	1 ac = 0.4047 ha
1 hectare (ha) = 10,000 square meters (m^2)	1 m^2 = .0001 ha

Volume

1 cubic centimeter (cm^3) = 0.0610 cubic inch (in^3)	1 in^3 = 16.3871 cm^3
1 cubic meter (m^3) = 35.3147 cubic feet (ft^3)	1 ft^3 = 0.0283 m^3
1 cubic meter = 1.308 cubic yards (yd^3)	1 yd^3 = 0.76455 m^3
1 liter (l) = 1.0567 quarts (qt)	1 qt = 0.9463264 l
1 liter = 0.2642 gallon (gal)	1 gal = 3.7845 l
1 kiloliter (kl) = 264.2 gal	1 gal = 0.0038 kl

Weight

1 gram (g) = 0.0353 ounce (oz)	1 oz = 28.3495 g
1 kilogram (kg) = 2.2046 pounds (lb)	1 lb = 0.4536 kg
1 metric ton (mt) = 1.1023 tons	1 ton = 0.9072 mt

Energy

1 joule = 0.0009 British thermal unit (BTU)	1 BTU = 1054.18 joule
1 joule = 0.2392 gram-calorie (g-cal)	1 g-cal = 4.1819 joule

Pressure

1 newton/square meter (N/m^2) = 0.0208 pound/square foot (psf)	1 psf = 48 N/m^2

Force

1 newton (N) = 0.2248 pound-force (lb-f)	1 lb-f = 4.4478 N

Speed

1 kilometer per hour (kph) = 0.621 mile per hour (mph)	1 mph = 1.0609 kph

ABBREVIATIONS AND ACRONYMS

A

ac	acre(s)
ACHP	Advisory Council for Historic Preservation
AERL	Aircraft Engine Research Laboratory
AWT	Altitude Wind Tunnel

B

BLS	U.S. Bureau of Labor and Statistics

C

$^{\circ}$C	degrees Celsius
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHIA	Cleveland Hopkins International Airport
cm	centimeter(s)
cm^3	cubic centimeter(s)
CO	carbon monoxide
CO_2	carbon dioxide

D

dBA	decibels (A-weighted)
DEIS	Draft Environmental Impact Statement
DNL	Day/night Sound Level
DOI	U.S. Department of the Interior
DOE	U.S. Department of Energy
DoD	U.S. Department of Defense

E

EA	Environmental Assessment
EMB	Environmental Management Branch
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPM	Environmental Programs Manual

F

$^{\circ}$F	degrees Fahrenheit
FEIS	Final Environmental Impact Statement
FPO	Federal Preservation Officer
FR	*Federal Register*
ft	feet
ft^2	square feet
ft^3	cubic feet
ft/s	feet per second
FWS	U.S. Fish and Wildlife Service

G

g	gram
gal	gallon(s)
GRC	Glenn Research Center

H

H_2O	water
ha	hectare(s)
HAER	Historic American Engineering Record
HASP	Health and Safety Plan
HHS	U.S. Department of Health and Human Services

I

in	inch(s)
IRT	Icing Research Tunnel

K

kg	kilogram(s)
km	kilometer(s)
km/hr	kilometers per hour (kph)

km^2	square kilometer(s)

L

l	liter(s)
lb	pound(s)
LMAL	Langley Memorial Aeronautical Laboratory

M

m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
m/s	meters per second
mg/l	milligrams per liter
mi	mile(s)
mi^2	square mile(s)
mm	millimeter
MOA	Memorandum of Agreement
mph	miles per hour
mt	metric ton(s)

N

N_2	nitrogen
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
nmi	nautical mile(s)
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places

O

O_3	ozone
ODS	ozone depleting substances
OHPO	Ohio Historic Preservation Office
OSHA	Occupational Safety & Health Administration
oz	ounce(s)

P

Pa	pascal(s)
Pb	lead
PCB	Polychlorinated biphenyls
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppm	parts per million
psi	pounds per square inch
PSL	Propulsion Systems Laboratory

R

RCRA	Resource Conservation and Recovery Act
RETF	Rocket Engine Test Facility
RI	Remedial Investigation

S

s	second(s)
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWP3	Storm Water Pollution Prevention Plan

U

USBC	U.S. Bureau of the Census
U.S.C.	United States Code
USGS	U.S. Geological Survey

V

VAP	Voluntary Action Program
V/STOL	Vertical/Stationary Takeoff and Landing Vehicles

W

WMT	Waste Management Team

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1 PURPOSE AND NEED

1.1 INTRODUCTION

The *Demolition of the Altitude Wind Tunnel Complex and Propulsion Systems Laboratory (Test Cells 1 & 2) at the National Aeronautics and Space Administration Glenn Research Center Final Environmental Assessment* has been prepared by the National Aeronautics and Space Administration (NASA) to assist in the decision-making process in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §4321 *et seq.*); the Council on Environmental Quality Regulations for implementing the procedural provisions of NEPA (40 CFR parts 1500–1508); and NASA's NEPA policy and procedures (14 CFR subpart 1216.3). This Environmental Assessment considers the historic and environmental impacts associated with the Proposed Action and the No-Action Alternative. No final action will be taken on this proposal until the decision-making process under NEPA has been completed. Demolition would not begin until all Federal, State, and local permits and approvals have been obtained.

1.2 SUMMARY OF THE PROPOSED ACTION

NASA's Proposed Action is to demolish the Altitude Wind Tunnel Complex (AWT) Complex and Propulsion Systems Laboratory (PSL) (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at Glenn Research Center (GRC). Activities include the salvaging and recycling of materials, wastes, and equipment where feasible, with waste minimization efforts utilized. The facilities are outdated and well beyond their expected and useful lives. Demolishing the AWT and PSL buildings would be expected to reduce GRC's deferred maintenance costs[1] for these facilities and provide real estate for future use. It is expected that the demolition would begin in calendar year 2007.

1.3 PURPOSE AND NEED

The purpose of the Proposed Action is to demolish the AWT and PSL (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at GRC to reduce the costs of future maintenance. The facilities in question are deteriorating and require significant maintenance. The AWT has long been abandoned and is used only for equipment storage. The PSL houses a small number of personnel in office and shop space; the mechanical and electrical systems are obsolete and in need of replacement, and the personnel safety systems are inadequate. In addition, the former capabilities of the AWT and the PSL (Test Cells 1 & 2) are duplicated or exceeded at other research facilities within the NASA Complex.

The estimated annual cost for deferred maintenance of the AWT is $4 million and would escalate over time as the facility deteriorates (GRC 2006e). The deferred maintenance costs for the PSL (Test Cells 1 & 2) are estimated at over $8 million and would escalate over time (GRC 2006i). The GRC needs to eliminate costly maintenance activities associated with abandoned and obsolete facilities.

[1] Deferred maintenance costs are those costs that would need to be incurred by GRC to maintain the buildings in working order and meet minimal facility conditions required by GRC.

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2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVE

This Chapter describes the Proposed Action (Section 2.1) in detail, and provides a summary of the activities and issues associated with the No-Action Alternative (Section 2.2).

2.1 DESCRIPTION OF THE PROPOSED ACTION

The National Aeronautics and Space Administration's (NASA) Proposed Action is to demolish the Altitude Wind Tunnel (AWT) Complex and Propulsion Systems Laboratory (PSL) Altitude Chambers (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at Glenn Research Center (GRC) (see Figure 2-1 for an aerial view of GRC). Activities include the salvaging and recycling of materials, wastes, and equipment where feasible, with waste minimization efforts utilized. It is planned that there would not be a significant amount of excavation required for below-grade structure removal. There is no plan for total foundation removal at either site.

The AWT and PSL are centrally located within the GRC at Lewis Field, Cleveland, Ohio. All areas within the Proposed Action are previously disturbed industrial areas. The AWT was built in 1944 to test aircraft engines and has not been used as a wind tunnel in approximately 50 years. The structure has since been abandoned except for storage. There are no current or future plans for its use. The exterior of the tunnel is deteriorating and is considered a public eyesore.

The PSL Altitude Chambers (Test Cells 1 & 2) were built in the early 1950's to provide true flight simulation for experimental research on air-breathing propulsion systems and have not been active since the 1980's. There are no current or future plans for their use. In addition, the PSL Access Building is beyond its useful life. The exterior of these facilities are deteriorated and require significant maintenance. Although the PSL presently houses personnel in office and shop space, the mechanical and electrical systems are obsolete and in need of replacement, and the life safety systems are inadequate. Demolition of the AWT and PSL buildings would be expected to reduce GRC's deferred maintenance costs and provide real estate for future structures or parking lots. In addition, the former capabilities of the AWT and the PSL (Test Cells 1 & 2) are duplicated or exceeded at other research facilities within the NASA Complex.

All facilities associated with the Proposed Action would be shut down and secured before demolition begins. Preliminary deactivation activities would remove major combustibles, drain liquids, permanently isolate all influent/effluent lines, and isolate all electrical power. The demolition of the AWT would begin in 2007 and be complete in approximately one year. The demolition of PSL would begin during calendar year 2007 and be complete in approximately one year (GRC 2006b). The estimated minimum cost to complete the Proposed Action is approximately $5 million, including $3 million for AWT and $2 million for PSL (GRC 2004b; GRC 2004c).

Source: GRC 2005a

FIGURE 2-1. AERIAL VIEW OF GLENN RESEARCH CENTER AT LEWIS FIELD

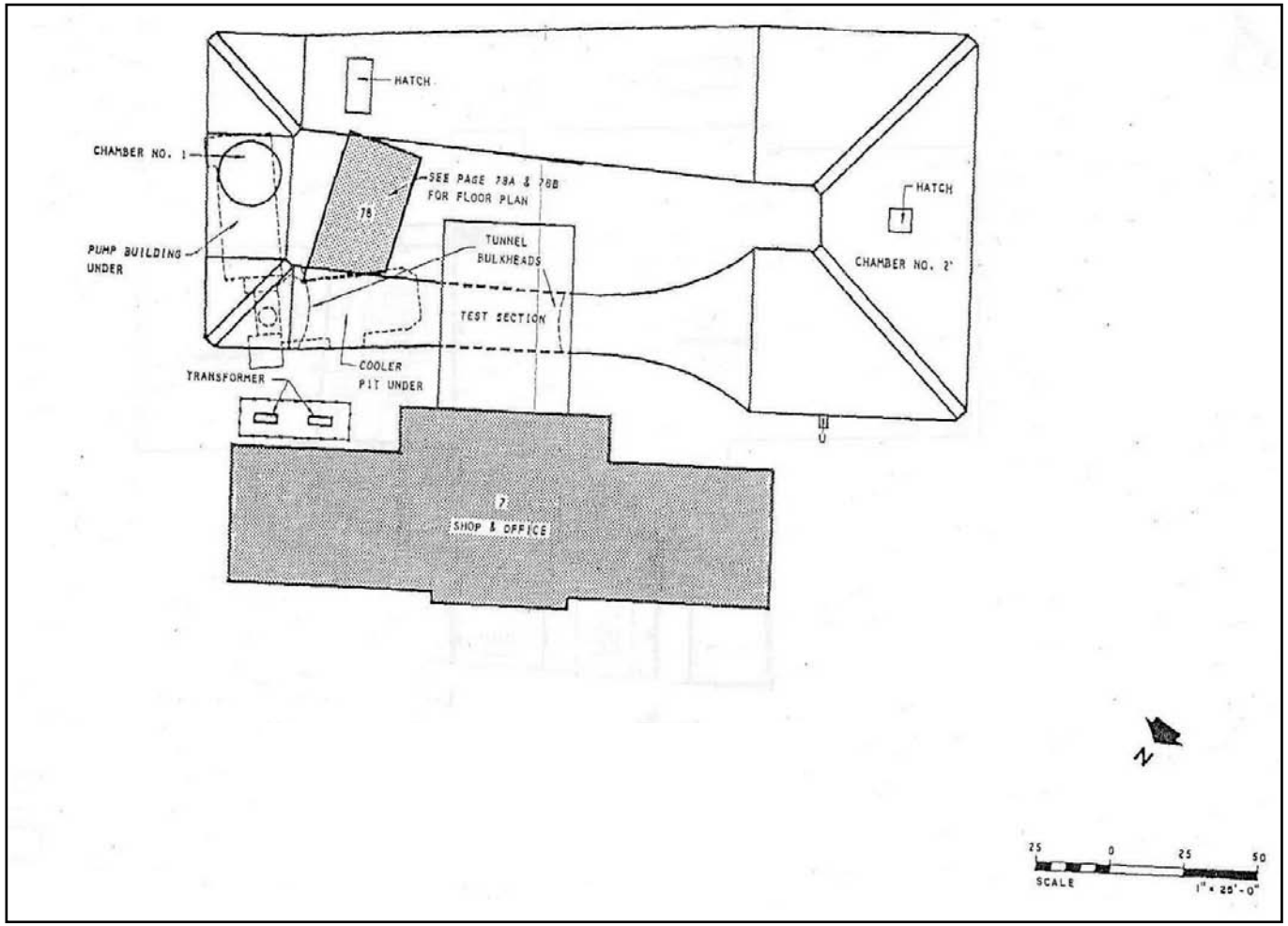
NASA GRC guidance documents with which the Proposed Action will comply include (but are not limited to) the GRC Environmental Programs Manual (EPM) (GRC 2005d), specifically the following Chapters:

- Chapter 5 Management of Hazardous Material, Hazardous Wastes, and Universal Wastes for Reuse, Recycling, or Disposal
- Chapter 7 Polychlorinated Biphenyls Policy
- Chapter 9 Asbestos
- Chapter 13 Lead
- Chapter 14 Elemental Mercury
- Chapter 17 Solid Waste, and
- Chapter 34 Handling, Reuse, and Disposal of Soil

Chapter 34 of the EPM defines requirements for the proper characterization and disposition of soil and other debris generated during the demolition activities. Any unanticipated contamination found during the demolition activities would be handled in accordance with the documents above.

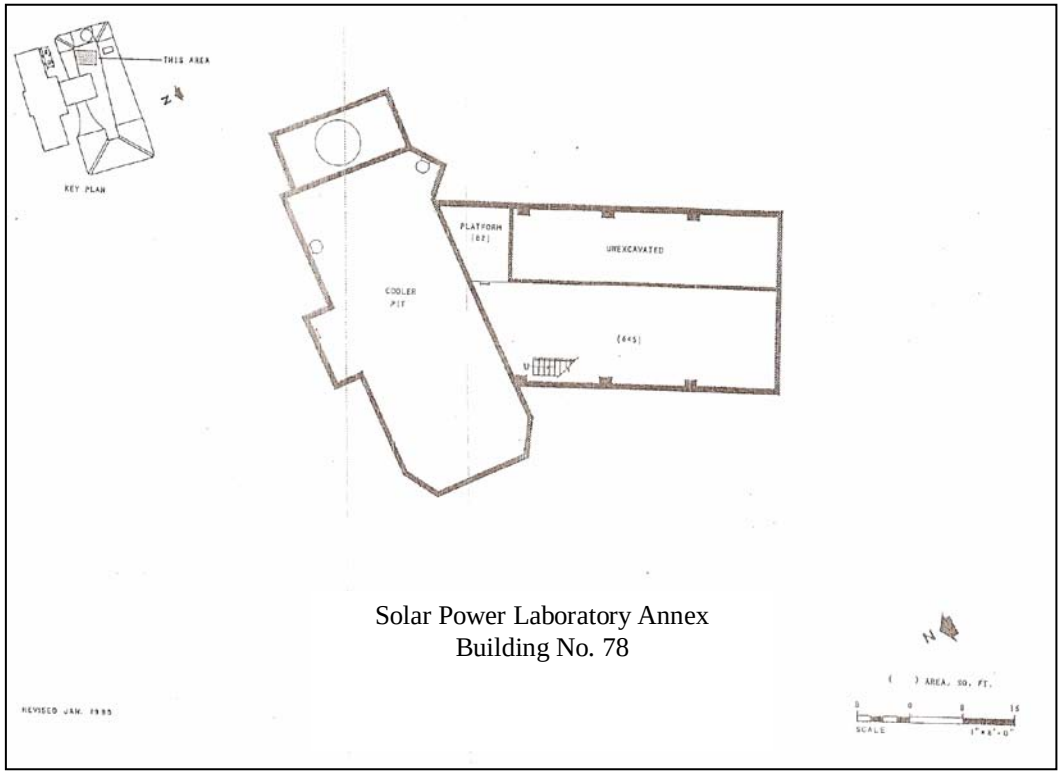
2.1.1 AWT Complex

The scope of work at the AWT Complex would include the demolition of the wind tunnel shell, associated pipe structures, ancillary facilities, and foundations down to approximately 0.6 meters (m) (2 feet (ft)) below grade. Figures 2-2 and 2-3 are schematics of AWT Building Nos. 7 and 78, respectively. Figure 2-4 is an aerial photo of the AWT.



Source: GRC 2006j

FIGURE 2-2. ALTITUDE WIND TUNNEL SCHEMATIC OF BUILDING 7



Source: GRC 2006j

FIGURE 2-3 ALTITUDE WIND TUNNEL SCHEMATIC OF BUILDING 78

FIGURE 2-4. AERIAL PHOTO OF THE ALTITUDE WIND TUNNEL COMPLEX

The specific facilities or equipment to be salvaged or demolished at the AWT Complex would include:

- The entire AWT structure external to the Building No. 7 High Bay. (Note: The remaining Test Section structure inside the Building No. 7 High Bay will be left undisturbed.)
- Building No. 78
- Vacuum Pump House
- Remaining heavy rotating electrical equipment in Building No. 8 on first floor, and
- Optional work to remove original motors and generators on the first floor of Building No. 8 and the original AWT Main Drive Motor on the third floor of Building No. 8.

All areas within the AWT Complex are on disturbed ground. The approximate area to be demolished would be 3,160 square meters (m^2) (34,000 square feet (ft^2)) (GRC 2006a). Specific site preparations would include relocation of utilities, termination of utilities as required, relocation of the Icing Research Tunnel (IRT) storage shed, relocation of occupants in Building No. 78, complete temporary fencing of the site, posting temporary signage, notification of building occupants, and blockage of Ames Road at Building No. 7 (GRC 2006a).

The proposed work consists of the complete dismantling and removal of all scheduled structures and equipment and excavation and removal of soils as required for new work. The project would also address the safe removal and disposal of asbestos, lead-based paint, and hazardous soils disturbed during excavation. A "Soil Determination Checklist, Form C-133" and "Site Specific Workplan (for Contaminated Waste Soils Operations)" would be prepared by NASA prior to removal of contaminated soils, and for the entire project, a "Site Specific Health and Safety Plan" would be prepared by the Contractor. Activities would include the following:

- Remove all hazardous materials and excavate affected soils. Due to past work practices and the use of construction materials common for its era, the AWT site contains areas known and suspected to be contaminated with hazardous materials. All sites involved in demolition activities would be investigated and sampled, as required, prior to commencement of work. A hazardous materials abatement plan would be required and carried out in accordance with procedures established in the EPM (GRC 2005d). The EPM addresses Federal, State, and local environmental regulations applicable to the management of hazardous materials and hazardous waste.

- Remove equipment and material for reuse/salvage, including steel scrap and concrete. All material identified for recycling would be weighed before leaving GRC. It is estimated that approximately 2,722 metric tons (mt) (3,000 tons) of scrap steel and 998 mt (1,100 tons) of concrete would be recycled (GRC 2006a).

- Dismantle and remove all scheduled buildings and structures. This would be accomplished by a demolition contactor using heavy hydraulic shears to cut up the tunnel shell and place in roll-offs (large waste containers) for off-site disposal. Heavy scrap steel and concrete rubble would be put into dump trucks for immediate removal. Additional equipment would include

a heavy lift crane, man lifts, portable air compressors, welding and cutting equipment, jackhammers, and small hand-held power tools (GRC 2006a).

- Remove foundations down to approximately 0.6 m (2 ft) below grade. If obvious or potential contamination is encountered, work would stop and the Ohio Environmental Protection Agency would be notified. If cultural features or artifacts are encountered, work in the vicinity of the discovery would stop and the appropriate cultural resource staff would be notified.

- Excavated soil would be characterized prior to transfer to a licensed disposal facility or reuse in a commercial or industrial application.

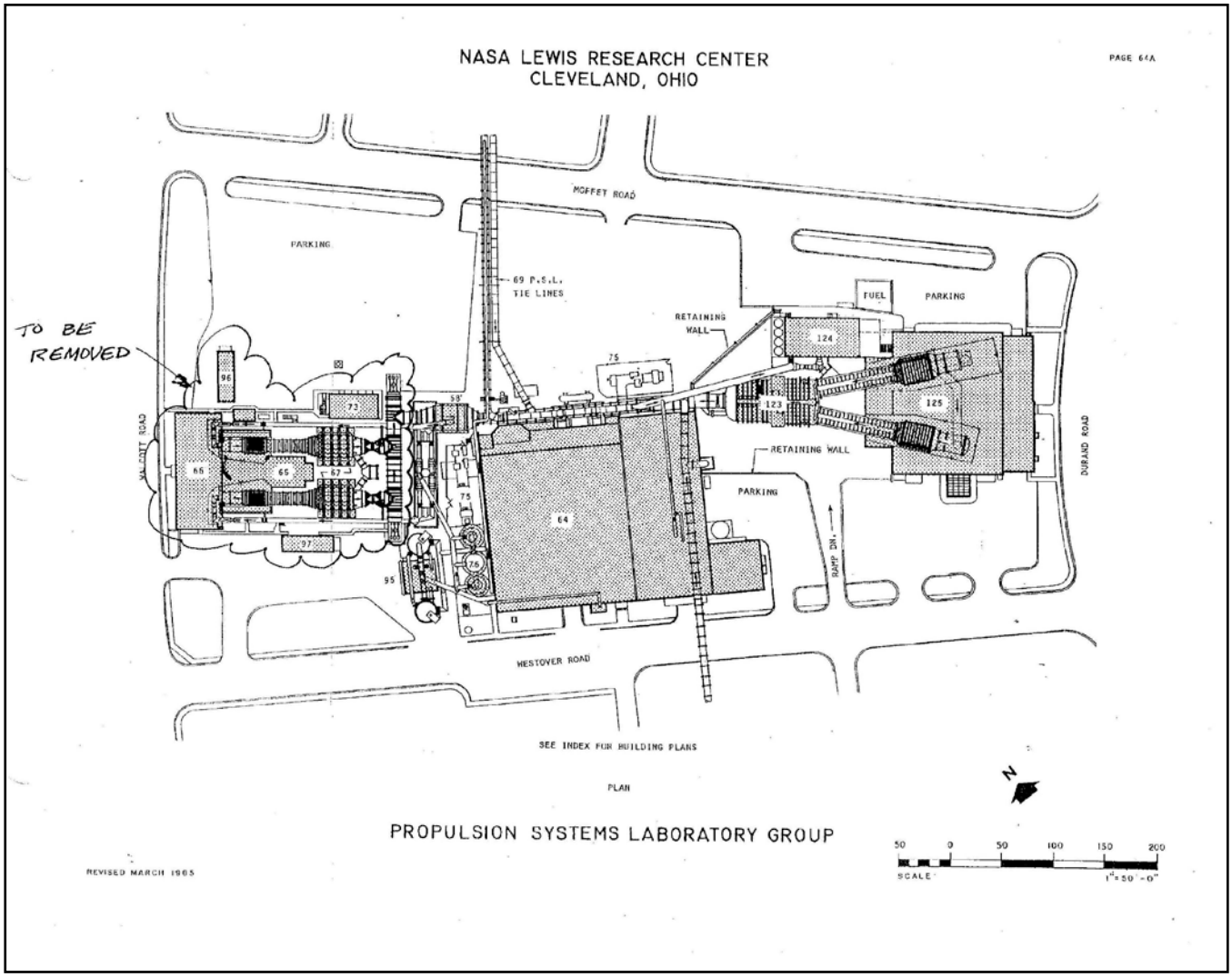
- Remove an estimated volume of 60 cubic yards (yd^3) (50 tons) of rubble (non-hazardous waste) from site. It is anticipated that there would be 80 yd^3 (40 tons) of waste materials (GRC 2006e). These estimated volumes would be disposed of in an acceptable off-site disposal facility.

- Fill foundation voids with clean borrowed fill. Material determined to not be clean would be rejected and returned to the contractor. The entire site is currently paved or occupied by foundations; all areas will remain paved and new paving will be placed over areas occupied by foundations scheduled to be removed (GRC 2006e).

- The GRC Environmental Management Branch (EMB) and GRC Waste Management Team (WMT) would provide guidance and oversight for waste management, reuse, and final disposal of all impacted materials and would ensure compliance with all requirements of the EPM (GRC 2005d).

2.1.2 PSL Altitude Chambers (Test Cells 1 & 2)

The Proposed Action at the PSL site includes demolishing the PSL Altitude Chambers (Test Cells No. 1 & 2), Buildings Nos. 65 and 66 and minor ancillary buildings. (See Figure 2-5 for the buildings to be removed, and Figure 2-6 for an aerial photo of the PSL). Included in the work scope would be the demolition of the buildings, test chambers, cooler structures, related piping and components, pipe supports, miscellaneous above-grade utilities, and foundations down to a minimum of 1.5 m (5 ft) below grade. The primary Altitude Exhaust piping is presently terminated at the existing Altitude Exhaust header northwest of Building No. 64; the bulkhead would be evaluated to determine if further isolation at the secondary cooler would be required. All other utilities would be terminated at the most practical point beyond the general demolition site boundary. The project would also include the safe removal and proper disposal of asbestos, lead paint, mercury, and hazardous materials and soils.



Source: GRC 2006k

FIGURE 2-5. PROPULSION SYSTEMS LABORATORY GROUP SCHEMATIC

The specific buildings to be demolished at the PSL site would include:

- No. 65 PSL Altitude Chambers (Test Cells 1 & 2)
- No. 66 PSL Access Building
- No. 67 PSL Primary Coolers (2 units)
- No. 73 PSL Service Support Building
- No. 96 PSL Fuel Storage Building
- No. 97 PSL Oxidant Storage Building

Building No. 68 PSL Secondary Cooler (1 unit) would most likely be left in place as a support structure for a combustion air line to PSL Test Cells Nos. 3 & 4 and a shop air line that needs to remain in service; this structure would be prepared and painted.

FIGURE 2-6. AERIAL PHOTO OF THE PROPULSION SYSTEMS LABORATORY

All areas within the PSL site are on disturbed ground. The PSL Complex occupies approximately 0.4 hectares (ha) (1 acres (ac)) of land. The approximate area to be demolished would be 4,645 m^2 (50,000 ft^2) (GRC 2006b).

The proposed work consists of the complete dismantling and removal of all building structures and equipment and excavation of affected soils. Activities would include the following:

- Remove all hazardous materials and excavate affected soils. Due to past work practices and the use of construction materials common for its era, the PSL site contains areas known to be, and other areas suspected to be, contaminated with hazardous materials. All sites involved in demolition activities would be investigated and sampled, as required, prior to commencement of work. A "Soil Determination Checklist, Form C-133" and "Site Specific Workplan (for Contaminated Waste Soils Operations)" would be prepared by NASA prior to removal of contaminated soils, and for the entire project, a "Site Specific Health and Safety Plan" will be prepared by the Contractor. A hazardous materials abatement plan would be required and carried out in accordance with requirements established in the EPM.

- Remove equipment and material for reuse/salvage, including steel scrap and concrete. All material identified for recycling will be weighed before leaving GRC. It is estimated that

approximately 1,207 mt (1,331 tons) of carbon steel, 1,134 kilograms (kg) (2,500 pounds (lb)) of stainless steel, and 2,562 mt (2,824 tons) of concrete would be crushed and reused as fill (GRC 2006m).

- Dismantle and remove all buildings and structures. This would be accomplished by a demolition contactor using a large backhoe with hammer attachment to breakup concrete structures, a large hydraulic shears to cut through metal, a crane to pickup and load debris, quad-axle dump trucks to haul away debris, roll-offs to segregate and store recyclable materials, a bulldozer for final clearing and grading, and various lifting devices for personnel, tools, and small machinery (GRC 2006b).

- Remove foundations down to approximately 1.5 m (5 ft) below grade. If obvious or potential contamination is encountered, work would stop and the Ohio Environmental Protection Agency would be notified. Underground storage tanks have not been identified in the demolition area. If cultural features or artifacts are encountered, work in the vicinity of the discovery would stop and the appropriate cultural resource staff would be notified.

- Excavated soil would be characterized prior to transfer to a licensed disposal facility or reuse in a commercial or industrial application.

- Remove rubble from the site estimated at a volume of 290 m^3 (379 yd^3) (GRC 2006m). This estimated volume would be disposed of in an acceptable offsite disposal facility.

- Fill foundation voids with clean borrowed fill and backfill material. Material determined to be not clean would be rejected and returned to the contractor. The site would then be graded and seeded to prepare for future development.

- Remove the South Parking Lot and return it to native grass and restore the North Parking Lot. Some additional debris would be generated (GRC 2006m).

- The GRC EMB and WMT would provide guidance and oversight for waste management, reuse, and final disposal of all impacted materials and would ensure compliance with all requirements of the EPM.

2.1.3 Assumptions Regarding Demolition Equipment

The contractor would use the largest and most efficient mechanical equipment appropriate to the site and the activity to minimize demolition time and energy consumption. A large backhoe with hammer attachment would most likely be used to breakup concrete structures, a large hydraulic shear to cut through the tunnel walls, a crane to pick-up and load debris, quad-axle dump trucks to haul away debris, a bulldozer for final clearing and grading, and various lifting devices for personnel, tools, and small machinery. If it is deemed practical, a concrete crusher would be used to recycle demolished concrete into usable fill to be used at the site; this is in keeping with green construction practices and helps preserve landfill space.

Roll-offs would be required for general scrap removal and to segregate and store recycling materials to make recycling cost effective for the contractor. Heavy steel scrap and concrete rubble would be put into dump trucks for immediate removal. All steel and concrete would be weighed before leaving GRC.

2.1.4 Assumptions Regarding Demolition Workforce

The work performed would be in accordance with Project Specifications, Occupational Safety and Health Act (OSHA) requirements, and GRC Safety Branch and Environmental Management Branch Requirements. In addition, all project work would be controlled by a Contactor or sub-Contractor generated Health and Safety Plan (HASP), a Demolition Plan consistent with the HASP requirements, and daily on-site Government inspections and routine Project meetings.

Only a small number of contracted workers (approximately 12 for AWT and 12 for PSL) would be involved in the demolition actions at any one time (GRC 2006a; GRC 2006b). Both locations would have a superintendent on-site during construction hours. A normal shift at the AWT site would be 7:00 am to 4:00 pm, with some weekend scheduling (GRC 2006a). A normal shift at the PSL site would be 7:00 am to 3:30 pm (GRC 2006b). Workers commuting to the project sites would generate minor increases in vehicle trips per day on GRC and local roadways. Parking would be available at both site locations.

The on-site contractors would keep all debris and scrap material picked up in a timely manner and maintain good housekeeping practices for containing and handling debris and scrap material. The contractor would not be permitted to store debris and scrap material onsite. Contract workers would follow established haul routes, speed limits, and procedures to minimize peak hour traffic congestion, and any special procedures related to public safety. In addition, the contractor would implement dust and soil erosion control measures.

2.2 DESCRIPTION OF THE NO-ACTION ALTERNATIVE

Under the No-Action Alternative NASA would not demolish the AWT Complex and PSL Altitude Chambers (Test Cells 1 & 2), their associated infrastructure, and select ancillary facilities at GRC. Thus, the potential impacts described in this EA would not occur. However, the No-Action Alternative would result in indefinite maintenance with increasing costs on the mentioned facilities and restrict real estate for future structures or parking lots. NASA's on-going neglect of these facilities would have an adverse effect with continued deterioration. In addition, the purpose and need for NASA's Proposed Action would not be met.

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3 AFFECTED ENVIRONMENT

The following sections provide a discussion of the existing environment to be affected by the Proposed Action and the No-Action Alternative. The Glenn Research Center (GRC) consists of two sites in Ohio, the Lewis Field in Cleveland and the Plum Brook Station in west central Erie County. In the context of this summary, GRC refers only to Lewis Field since demolition activities associated with the Proposed Action would occur only at this location.

3.1 LAND USE

The GRC is located in western Cuyahoga County, Ohio and is approximately 32 kilometers (km) (20 miles (mi)) southwest of downtown Cleveland. The GRC borders the Cleveland Hopkins International Airport to the east and to the north and west is the Rocky River Reservation, a part of the Cleveland Metropolitan Park District. The southern boundary of GRC is adjacent to highly urbanized and developed residential, business districts, and industrial complexes (GRC 2005a).

The GRC encompasses approximately 148 hectares (ha) (365 acres (ac)) of land and supports NASA's research, technology, and development programs in the areas of aero-propulsion, space flight systems, space propulsion, space science applications, and space power. Most of GRC is considered fully developed with offices, test facilities, and support facilities, with the exception of about 69 ha (171 ac) that are considered undeveloped (GRC 2005a).

The AWT and PSL sites are centrally located in highly congested areas of GRC. The AWT Complex and PSL both occupy approximately 0.40 ha (1 ac) of land (GRC 2006b). See Figures 2-2 and 2-6 for a map illustrating the locations of the facilities. With the exception of limited office space at PSL, both sites have long been inactive and there are no future plans for their use.

3.2 CLIMATE AND AIR QUALITY

Climate: The climate at GRC can be characterized as continental. Summers are warm and humid, with average temperatures of 21º C (70º F). Winters are relatively cold and cloudy, with an average temperature of -2º C (28º F). Precipitation averages 89 cm (35 in) per year. Prevailing winds are from the south to southwest (GRC 2005a).

Air Quality: Air quality is regulated through the National Ambient Air Quality Standards promulgated under the Clean Air Act. Table 3-1 provides the pollutants and the Federal and State standards against which they are monitored.

The City of Cleveland performs air monitoring for Cuyahoga County for criteria pollutants, (carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide), total suspended particulates, and toxic air pollutants. Cuyahoga County is designated as an attainment area except for the $PM_{2.5}$ and 8-hour ozone standards (EPA 2005; GRC 2006c). Cuyahoga County is also in maintenance for carbon monoxide. GRC currently operates under a CAA Title V Operating Permit, which was issued in 2004 (GRC 2004b).

TABLE 3-1. SUMMARY AIR QUALITY STANDARDS

Criteria Pollutant	Federal [(a)] and State of Ohio Standards µg/m^3 (ppm)	
Carbon Monoxide (CO) 1-hour Average 8-hour Average	 40,000 (35) 10,000 (9)	 Primary Primary
Lead (Pb) Quarterly Average	1.5	Both Primary & Secondary
Nitrogen Dioxide (NO_2) Annual Arithmetic Mean	100 (0.053)	Both Primary & Secondary
Ozone (O_3) 1-hour Average 8-hour Average	 235 (0.12) 157 (0.08)	 Both Primary & Secondary
Particulate Matter (PM_{10}) 24-hour Average	150	Primary
Particulate Matter ($PM_{2.5}$) Annual Arithmetic Mean 24-hour Average	 15 35	 Both Primary & Secondary
Sulfur Dioxide (SO_2) Annual Arithmetic Mean 24-hour Average 3-hour Average	 80 (0.03) 365 (0.14) 1,300 (0.5)	 Primary Primary Secondary

a. Federal primary standards are levels of air quality necessary, with an adequate margin of safety, to protect the public health. Federal secondary standards are levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

b. Ohio has not adopted the newly changed 24-hour Average for the Particulate Matter ($PM_{2.5}$).

µg/m3 = micrograms per cubic meter
ppm = parts per million

The electronic Title V Operating Permit application includes all sources classified as "non-insignificant" and “insignificant”. Non-insignificant sources at Lewis Field include air heaters, boilers, and steam generators. The majority of emissions from Lewis Field result from the combustion of fuels including natural gas, #2 fuel oil, and jet fuels. Estimated actual emissions, based on the Emission Fee Report for 2003, are: 0.9 mt (1 ton) of particulates, 0.9 mt (1 ton) of sulfur dioxide, 25 mt (28 tons) of nitrogen oxides, 1.8 mt (2 tons) of organic compounds, and 20 mt (22 tons) of carbon monoxide annually (GRC 2005a).

The discrepancy between Lewis Field’s theoretically high potential-to-emit and the relatively low actual annual emissions is a result of the nature of research. In this industrial classification, analytical data or “research” is the product, and, as such, is not like manufacturing or mass production. Since each experiment is configured individually the equipment cannot operate

8,760 potential hours per year. In general, the areas with the highest potential to emit take the longest to prepare to operate. In some cases the preparation time may take six months, with the projects being planned years in advance. This type of physical limitation is difficult to quantify for permitting applications. Therefore, these units are often addressed as being capable of operating continuously or are assigned special enforceable limitations. For nearly all of the on-site facilities the operation is theoretically unlimited. That is, the facilities are legally allowed to operate 8,760 hours per year (GRC 2005a).

NASA Headquarters and GRC have established ozone-depleting substances (ODS) management policies and plan to eliminate the use of these chemicals in all but critical applications. Chapter 26 of the GRC EPM addresses the ODS policy (NASA 2005d). All ODS are controlled substances at Lewis Field and require special approval before they may be purchased. Larger equipment containing ODS chemicals are monitored and their chemical use is tracked. New refrigeration equipment must be ODS-free whenever possible (GRD 2005a).

Lewis Field developed specific reduction goals for three chlorofluorocarbon chemicals in compliance with Executive Order 12856 (1993), *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*. Additionally, Executive Order 12843 (1993), *Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances*, and Executive Order 13148 (2000), *Greening the Government Through Leadership in Environmental Management*, direct Federal agencies to use alternative chemicals to the greatest extent possible. Lewis Field continues to use ODS chemicals in research, cleaning, cooling and lubricating applications, however, with the current policy, the use of these materials is declining (GRC 2005a).

3.3 WATER RESOURCES

3.3.1 Surface Water

The primary surface water features at the Lewis Field site are the Rocky River and its tributary, Abram Creek. The Rocky River flows along the western edge of the Lewis Field site, separating it from the Rocky River Reservation of the Cleveland Metropolitan Park District. The Ohio EPA lists the drainage area of the Rocky River at 761 square kilometers (km) (294 square mi). The Rocky River has an average daily discharge rate of 7.8 cubic meters (276 cubic feet) per second, as measured at a U.S. Geological Survey (USGS) gauging station 2.6 km (1.6 miles (mi)) upstream from GRC. The 7-day, 10-year low flow is estimated by the USGS to be 0.04 cubic m (1.4 cubic ft) per second. Wastewater discharges and removals within the basin are significant and result in an effective 7-day, 10-year low flow of 0.87 cubic m (30.6 cubic ft) per second. After passing GRC, the river flows north approximately 18 stream-km (11 stream-mi) and discharges into Lake Erie. There is no commercial fishing in the Rocky River or its tributaries although there is recreational fishing. Abram Creek begins in a low-lying area south of Cleveland Hopkins International Airport (CHIA) and flows through a heavily industrialized area, crossing the GRC property. It travels approximately 6 km (4 mi) to its confluence with the Rocky River. Near GRC, both Abram Creek and Rocky River are in narrow, steep valleys, 15 to 30 m (50 to 100 ft) below the elevation of the main portion of GRC. Lake Erie is 8 km (5 m) to the north. Lake Erie has a surface area of approximately 25,700 square km (9,919 square mi) and an estimated volume of 471 cubic km (113 cubic mi) (GRC 2005a).

Most surface water runoff from GRC flows through the storm sewer system and natural swales to Abram Creek and Rocky River. Although most precipitation is believed to flow overland, several low volume seeps have been observed on the Abram Creek Valley walls after periods of heavy rainfall (GRC 2005a).

The stormwater sewer system is designed to collect precipitation from storm drains, building drainage, and yard inlets located throughout GRC. Stormwater discharges are regulated under two separate Ohio EPA National Pollution Discharge Elimination System (NPDES) permits. Discharge monitoring reports are submitted monthly. Since many of the larger outfalls receive stormwater from the airport, monitoring and control of these discharges can be complicated (GRC 2005a). Based on historical data, NPDES-permitted discharges from Lewis Field appear to have minimal impact on the water quality of the Rocky River. This was confirmed by a study, which found no significant differences in the biological communities upstream and downstream from the Airport (GRC 2005a).

Ohio EPA NPDES Permit OH3IO00001*FD solely requires the Center to account for all outfalls from the Center and thus the monitoring and sample reporting of a select number of those outfalls (most notably those with the highest flows). SWIM-Ware software is used for reporting purposes.

Ohio EPA NPDES General Permit OHQ000001 establishes NASA GRC as a Non-Traditional Municipal Separate Storm Sewer System (MS4) and further identifies NASA GRC with the Ohio EPA Facility Permit Number: 3GQ00067*AG. This permit also requires the Center to account for all outfalls at the Center, but does not regulate what is discharged from the outfalls by any means of monitoring or sampling.

This permit (3GQ00067*AG) requires the Center to develop and implement the Storm Water Management Program (SWMP) to prevent storm water pollution from occurring at the Center and thus polluted discharges to Abram Creek and Rocky River. This permit, by means of the SWMP, could in the future be required to have established effluent guidelines as the result of installing certain pollution controls, better known as Best Management Practices (BMPs), since aspects of the SWMP require the documentation showing there is an improvement of storm water discharges due to efforts of the Center's SWMP.

The effectiveness of the storm water management program is currently monitored through NPDES permit guidelines and monthly reports, Cuyahoga Board of Health Annual Fecal Coliform sampling events, and through the Corrective and Preventive Action Reporting System (CPARS).

Rocky River and Abram Creek are classified as Warmwater Habitats[1] by the Ohio EPA and portions of Rocky River are designated as "Seasonal Salmonid" due to the occasional migration of salmon. Other use designations for portions of Abram Creek and Rocky River include

[1] *Warmwater Habitat (WWH)* - this use designation defines the "typical" warmwater assemblage of aquatic organisms for Ohio rivers and streams; *this use represents the principal restoration target for the majority of water resource management efforts in Ohio.*

Primary Contact Recreation (swimming) and Agricultural and Industrial Water Supply. The Ohio Department of Natural Resources (ODNR) Division of Wildlife stocks the Rocky River with juvenile steelhead salmon each spring. Because the river flows through the Cleveland Metroparks, it is designated as State Resource Water in the vicinity of Lewis Field. The designation affords special protection under the State's anti-degradation policy (GRC 2005a).

Water quality in Rocky River and Abram Creek has improved in the last two decades. Many publicly owned treatment works (POTWs) have been upgraded. Some have been eliminated in favor of centralized treatment by the Northeast Ohio Regional Sewer District (NEORSD). Several industries discharging to Abram Creek and Rocky River upstream of Lewis Field have also improved the quality of their discharges. The Ohio EPA Division of Surface Water conducted an intensive survey of Rocky River and its tributaries in 1992. Although the survey identified few exceedances of acute or chronic water quality criteria, only 3% of the surveyed sections of the river main stem were in full attainment of the warmwater habitat aquatic life use designation. The remaining sections failed one or more of the three biological index criteria. In past years, sporadic exceedances of iron, zinc, and total phosphorous limits have been observed (GRC 2005a).

A qualitative biotic survey of the Rocky River and Abram Creek was conducted in 1994 (GRC 2005a). The survey examined water quality, fish, macroinvertebrates, vertebrates, and plants at Abram Creek and Rocky River in the vicinity of Lewis Field. Both streams displayed signs of environmental degradation, as indicated by the number of taxa, the types of organisms, and the density of organisms found (GRC 2005a).

Conditions worsened on moving upstream. Abram Creek was in worse condition than Rocky River, with the unnamed tributary to Abram Creek more impacted. A more quantitative survey of Rocky River and Abram Creek was commissioned in 1995 by the CHIA. This confirmed earlier studies, which concluded that neither stream met the warmwater habitat criteria. The study indicated that chemical pollutants in the water and sediments were not significant contributors to the degraded condition of the biological communities. Rather, stream flow patterns indicative of highly urbanized storm flow drainage may be important factors in explaining the degradation of stream biota. High peak flows and rapid changes in flow lead to unstable streambeds, resulting in periodic disturbance of the habitat (GRC 2005a).

The most current data available stems from the total miles assessed in 1997; 72 km (44.5 miles) were in full attainment of the warmwater habitat aquatic life use (48% of the study area); 59 km (36.5 miles) demonstrated partial attainment (40% of the study area) and 18 km (11.3 miles) were in non-attainment of the warmwater habitat use (12% of the study area) (Ohio EPA 1999). The results demonstrate declines in the percentage of full and nonattainment (down 7% and 13 %, respectively) and an increase in the percentage of partial attainment (up 22%) compared with 1992 (Ohio EPA 1999; GRC 2005a).

3.3.2 Groundwater

Groundwater is rarely used in the vicinity of GRC. Groundwater is believed to occur in two distinct lithologic zones, in the shale bedrock and in perched lenses in the overlying

unconsolidated materials. Of 77 borings advanced during the Remedial Investigation (RI) of GRC, only 11 had wet or saturated zones in the overlying soil. These zones were approximately 15 to 76 centimeters (0.5 to 2.5 ft) thick. The zones are thought to be isolated and not to contain significant amounts of groundwater (GRC 2005a).

The water table generally mimics the surface topography, so groundwater in the unconsolidated zone is expected to discharge to Abram Creek and Rocky River. The groundwater zone within the bedrock is under artesian pressure due to the low hydraulic conductivity of the overlying soils. Even so, the recharge rate is very slow and the shale bedrock has very low permeability (GRC 2005a). Indications are that the bedrock aquifer can be expected to yield no better than approximately 3.8 liters (1 gallon) per minute (GRC 2005a).

Seven permitted drinking water wells are within 6 km (4 mi) of GRC, according to nearby City and Cuyahoga County records (GRC 2005a). An earlier 1969 survey found 220 individuals in the Rocky River Basin who used groundwater for drinking water. Groundwater flow from GRC is toward the adjacent creek and river, which precludes it from contaminating water wells in the vicinity (GRC 2005a).

Groundwater is not used for water supply at GRC. No aquifer at GRC has been designated as a sole or principal drinking water source under the Safe Drinking Water Act. There are no underground injection wells at GRC (GRC 2005a).

3.4 AMBIENT NOISE

Several noise sources exist in the general vicinity of GRC. Foremost among these is the Cleveland Hopkins International Airport (CHIA), which is adjacent to GRC. Other, lesser noise sources nearby includes a Ford Motor Company factory and sources of traffic noise such as two major Interstate highways and a large exhibition hall (the I-X Center) (GRC 2005a).

Noise generated at GRC can be attributed to such sources as research operations (e.g., wind tunnels and engine test cells), transient noises such as releases from valves, NASA aircraft, construction activities, and traffic noise. Research sources such as the wind tunnels generate noise from the movement of rushing air. Wind tunnel noise at the fence line is less than 55 dBA. The central process air system in Building 64 can generate high noise levels from its compressors, exhausters, heaters, chillers, and other equipment (GRC 2005a). Noise sources of various common types and their noise levels are shown in Table 3-2.

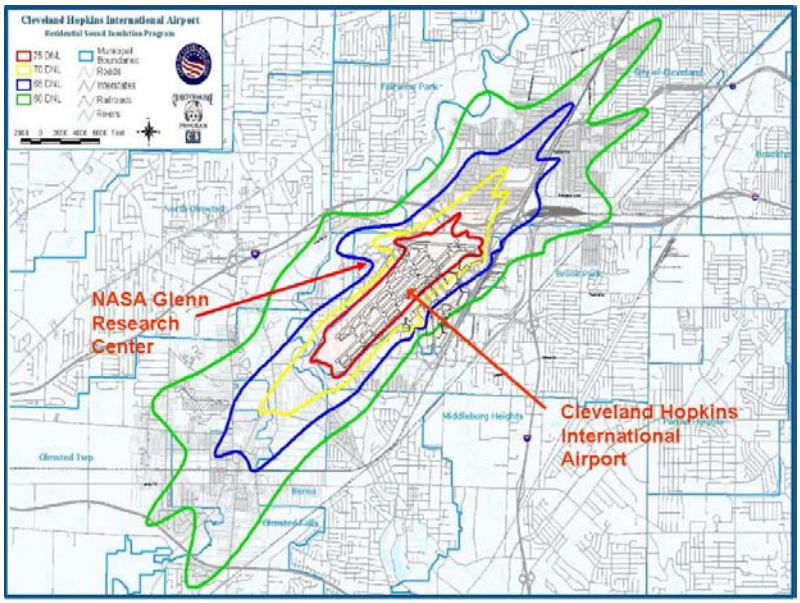
Recent surveys indicate that, with the exception of transient noise spikes, the highest on-lab noise levels measured near operating systems are in the 90-95 dBA range, with a maximum of 102 dBA. Transient peaks in noise levels may occur due to the action of relief valves, vent noise, etc. Aircraft housed in the flight research building (building 4, the hangar) can taxi directly to runways at CHIA. Aircraft operations can generate maximum environmental noise levels between 80 and 90 dBA in nearby pedestrian areas on GRC. Construction generates noise from machinery and vehicular traffic. The general noise level of GRC is well below the average day/night sound level (DNL) of the CHIA. Noise levels at the GRC fence line are generally below 70 dBA, with much of this noise attributable to off-site sources. The CHIA is

the single greatest generator of noise at GRC (GRC 2005a). Approximately two-thirds of the center is within the 65 dBA DNL contour with the rest of the center within the 60 dBA DNL contour of the CHIA Residential Sound Insulation Program noise contour map (Figure 3-1).

TABLE 3-2. TYPICAL SOUND LEVELS FROM INDOOR AND OUTDOOR NOISE SOURCES

Noise Source	Sound Level (dBA)	Typical Public Reaction
Threshold of Hearing	0	
Quit Rural Nighttime	20	
Soft Whisper	30	Very Quiet
Quiet Urban Nighttime	40	
Dishwasher in Next Room	50	Acceptance
Conversational Speech	60	Complaints Rare
Vacuum Cleaner	70	Complaints Possible
Very Noisy Restaurant	80	Complaints Likely
Food Blender	90	Hearing Damage (8 hours)
Garbage Truck	100	
Live Rock Music	130	Limits Amplified Speech
Jet Plane	140	Threshold of Pain
Rocket Launching Pad	180	

Source: Salvato 1992; Plog 1996



Source: Cleveland Hopkins International Airport, Residential Sound Insulation Program 1999

FIGURE 3-1. NOISE CONTOURS FOR THE GLENN RESEARCH CENTER

3.5 GEOLOGY AND SOILS

The area near GRC consists of gently rolling uplands created by glacial outwash. GRC is generally level due to extensive cut-and-fill operations that reclaimed the area from steep drainage swales. These drainage features were filled in with a variety of undifferentiated soils and gravels, construction debris, and industrial and domestic waste (GRC 2005a).

The area surrounding GRC is located on the western flank of the undeformed portion of the Appalachian Basin. The basin contains a southeastward-thickening prism of sandstones, carbonates, shales, and salts that aggregate to a thickness of about 1,980 to 7,010 m (6,500 to 23,000 f). Bedrock in the immediate vicinity of GRC is composed of the Cleveland Shale Member of the Ohio Shale. The probability of an earthquake causing structural damage is minimal. The Ohio Shale is fissile, however, and offers differential resistance to applied stresses depending upon the inclination to the direction of stratification (GRC 2005a).

Soils in the vicinity of GRC generally have low to very low permeability and are classified as a silty clay loam, although they often grade to a clay loam glacial till. The natural soils and parent materials in many cases have been removed or covered with fill. Specifically, PSL is located over an area with a fill depth of 3 to 19.8 m (10 to 65 ft) (GRC 2005a).

Laboratory results from a subsurface soil investigation around the AWT indicate that no contaminants were detected above applicable Ohio Voluntary Action Program (VAP) standards for commercial or residential use scenarios (Compliance Technologies, Inc. 2006).

Surface soils with the PSL 1 & 2 Complex (*i.e.*, down to 0.6 m (1 ft) below grade) have been impacted by past practices at the site. Results from a recent soil sampling and analysis effort indicate the presence of asbestos and organic and metallic chemicals exceeding applicable GRC EPM guidelines, Ohio VAP standards, and Federal Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261.24). Generally, hazardous soils are located to the east of the Primary Coolers No. 1 and No. 2 (Building 67 area), northeast of Building 73, northwest of oil/water separator #19, southeast of Building 96, northwest of Building 66 (front of building), and northeast porting of Building 65 (NASA 2006).

3.6 NATURAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

The GRC lies in the Beech-Maple Forest region of the great eastern Deciduous Forest of Eastern North America. This region has been classified as a mixture of Beech Forest, Mixed Oak Forest, Elm-Ash Swamp Forest, and Mixed Mesophytic Forest. Most of the site is now too highly disturbed to support significant numbers of indigenous Ohio plant species. The gorge of Abram Creek and the tops of the bluffs above the valley are the only areas that retain natural qualities (GRC 2005a). The areas surrounding the AWT and PSL facilities are predominantly paved or covered by lawn and landscaped vegetation (primarily ornamentals, ground cover and shade trees).

Animals that inhabit GRC include birds, amphibians, reptiles, butterflies and moths, and various mammals. Most common birds include the European starling, house sparrow, American robin, chimney swift, and house finch. Few amphibian species, one reptile, many species of butterflies

and moths, and three common bat species have been identified at GRC. Other mammals, such as squirrels, chipmunks, rabbits, deer, and groundhogs, also likely inhabit the area (GRC 2005a).

Two State-listed potentially threatened plant species, pigeon grape (*Vitis cinerea*) and American chestnut (*Castanea dentata*), are found at GRC. Neither species are located near the AWT or PSL sites. The GRC has no known adverse affects on endangered species beyond its borders. There is no evidence of any federally threatened or endangered animal species at GRC (GRC 2005a).

3.7 SOCIOECONOMICS

Over 3,100 scientists, engineers, administrative professionals, clerical staff, technicians, and trade personnel are employed at GRC, with over 65 percent of these employees living in Cuyahoga County (GRC 2005a). In 2004, population in Cuyahoga County was 1,320,625 persons (USBC 2006). In the fiscal year of 2003, GRC generated $1,288 million in spending throughout Ohio. Of this, $439 million resulted from direct spending and more than $849 million resulted from indirect and induced spending throughout the regional economy (GRC 2003).[2]

The AWT and PSL sites no longer contribute to the economic growth of GRC. Neither site has operated as configured for over two decades. AWT is currently abandoned and PSL provides office space for approximately 50 workers. Maintenance costs are escalating as the structures are progressively degrading. Estimated deferred maintenance costs are approximately $4 million for AWT and $8 million for PSL (GRC 2006i).

3.8 CULTURAL RESOURCES

Cultural resources are any prehistoric or historic building, structure, object, site or district considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include historic architectural resources, archaeological resources, and traditional resources. Historic architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Archaeological resources are locations where prehistoric or historic activity measurably altered the earth or produced deposits of physical remains (e.g., arrowheads, bottles). Traditional resources are associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community.

Historic properties, as defined in the National Historic Preservation Act (NHPA), are significant architectural, archaeological or traditional resources that are either eligible for listing, or listed in, the National Register of Historic Places (NRHP). Individual properties eligible for listing in the NRHP are at least 50 years old and are typically of State or local significance. National Historic Landmarks (NHLs) are properties that have been determined by the Secretary of the Interior to be nationally significant in American history and culture. If not already listed on the NRHP, an

[2] Direct impact represents the value of goods and services purchased by GRC. Indirect impact represents the value of goods and services purchased by local companies to provide goods and services required by GRC. Induced impacts measure the change in local household spending patterns resulting from increased earnings by employees in local industries producing goods and services for GRC.

NHL is automatically added to the Register upon designation. About three percent of Register listings are NHLs.

In addition to individual property listings, a district containing multiple buildings or structures may be eligible for listing. A National Register historic district is a concentration of historic buildings, structures, sites, or objects united historically or aesthetically by plan or physical development. Any one of the properties in a historic district may not have particular historical, architectural, engineering, or archaeological distinction, but the collection must have significance in one of these areas. Boundaries for historic districts are drawn to include a significant concentration of historic properties. Most historic districts contain both contributing and non-contributing properties. A contributing property adds to the historic associations, historic architectural qualities, or archaeological values for which the historic district is significant. Non-contributing properties do not add to the character of the historic district because they are less than 50 years old and they may be older properties that have been significantly altered, or they may be properties not associated with the historic theme or time period of the district.

As a Federal agency and in order to comply with the NHPA, NASA must identify and protect its historic properties and ensure that they are managed and maintained in a way that considers their historic and cultural values.

3.8.1 Historical Setting

The National Advisory Committee for Aeronautics (NACA), the predecessor organization to NASA, was created by President Woodrow Wilson in 1915 to organize American aeronautical research and "to supervise and direct the scientific study of the problems of flight, with a view to their practical solution." Initially, the task of NACA was to coordinate efforts already underway across the nation to advance airplane technology. While not originally intended to establish and administer its own laboratories, NACA's mission and workforce soon grew to cover a greater role in aeronautics research in the U.S.

The first research and testing facility created by NACA in 1917 was the Langley Memorial Aeronautical Laboratory (LMAL) in Hampton, VA, which is now known as NASA Langley Research Center. In 1939, NACA established a second laboratory for aircraft research at Moffett Naval Air Station near San Francisco. The facility is now known as NASA Ames Research Center.

GRC was the third laboratory established by NACA. In 1940, Congress authorized construction of an aircraft engine research laboratory in Cleveland, Ohio. The site was a large field immediately west of the Cleveland Municipal Airport. Originally, bleachers and a parking lot had been built on the field to accommodate the large crowds that came to view the National Air Races that were held at the airport throughout the 1930's. The Federal Government purchased the 81 hectares (200 acres) of land for $500 from the City of Cleveland and the bleachers were pulled down to make way for the new laboratory. Initial building plans called for an administration building, a test hangar, an engine research laboratory, a fuels and lubricants building, and an altitude wind tunnel. Plans for a Jet Propulsion Static Laboratory and Icing Research Tunnel were added during the initial phase of construction. Groundbreaking at the Cleveland site was held on January 23, 1941 and the new Aircraft Engine Research Laboratory (AERL) was dedicated in 1943. During World War II, the AERL was involved in

“troubleshooting” for both the military and engine manufacturers. Although specifically designed to test piston engines, the post-war mission of the facility focused on research and development of the jet engine. In 1947, the AERL was renamed the Flight Propulsion Research Laboratory to reflect its role in propulsion research; the name was changed again the next year to Lewis Flight Propulsion Laboratory in honor of George W. Lewis, NACA’s first Director of Aeronautical Research.

In the decade that followed, the facility continued to meet the research needs of the jet age by extending its size and scope. This expansion included: building two new wind tunnels, the Materials and Structures Complex, the Rocket Engine Test Facility and the Propulsion Systems Laboratory; designing and building a nuclear test reactor (for which NACA acquired the 2,428-ha (6,000-ac) Plum Brook Army Ordnance Works in Sandusky, Ohio); and, as a precursor to the space age, developing liquid hydrogen fuels research which broke new ground in the field of aircraft propellants.

In 1958, when NACA was dissolved and NASA was established, the AERL became part of the foundation of the new Agency and was renamed the NASA Lewis Research Center. The Center undertook additional responsibilities in the fields of research and development in space power technology, launch vehicles and chemical and electric propulsion for space. The Center acquired an additional 56 ha (139 ac) and built the Developmental Engineering Building, the Electric Propulsion Laboratory, the Energy Conversion Laboratory, and the Zero Gravity Research Facility.

In 1999, the Center was officially renamed the NASA Glenn Research Center (GRC) at Lewis Field, to recognize the contributions and legacy of two men, John H. Glenn and George W. Lewis. Today, NASA GRC consists of 148 ha (365 ac), has 150 buildings, including 31 major research facilities and approximately 3,300 civil and contract employees.

3.8.2 Architectural Resources

As part of the National Park Service 1984 Man in Space thematic nomination, two NASA GRC facilities were designated National Historic Landmarks (NHL). They were the Zero Gravity Facility, Building 110, and the Rocket Engine Test Facility, Building 202.

The Zero Gravity Research Facility is NASA's premier facility for conducting ground based microgravity research and is the largest facility of its kind within the United States. Operational since 1966, it is one of two drop towers located at NASA GRC. Built during the Space Race Era of the 1960's, it was originally designed to support research and development involving space flight components and fluid systems in a weightless environment. Today, the facility is used worldwide by researchers to study the effects of microgravity on physical phenomena such as combustion and fluid physics. It is also used to develop and test experimental hardware designed for flight aboard the Space Shuttle and International Space Station.

The Rocket Engine Test Facility (RETF) was constructed in 1956. The facility made a number of significant contributions to the U.S. aerospace industry in the area of rocket-engine propulsion, primarily with the development of the technology required to use high-energy liquid propellants, such as liquid hydrogen, as rocket-engine fuel. The tests performed in the RETF proved invaluable to the manned Apollo program and to unmanned programs for exploring the

solar system, and the hydrogen-oxygen engines currently used by the Space Shuttle were also tested in this facility.

The RETF was located immediately adjacent to the Cleveland Hopkins International Airport. As a result of an airport expansion project, the RETF was demolished in 2003. In order to mitigate and resolve the impacts to the NHL, NASA entered into a Memorandum of Agreement with the Federal Aviation Administration, the Ohio SHPO, and the ACHP. Several of the mitigation measures included:

- Recordation of the RETF to National Park Service Historic American Engineering Record (HAER) standards.
- Photographs, videotapes, films and written records which describe the RETF.
- Development of a web-based presentation on the RETF, its research programs, video clips, and written materials.
- Videotape interviews of persons who worked in the RETF and on associated research programs.

In addition to the mitigation measures listed above, the City of Cleveland is designing a new building within GRC's campus to house critical test equipment from RETF.

In addition to GRC's two NHL's, in 1987, the Icing Research Tunnel (Building 11) was named an International Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers. This facility has a unique heat exchanger and a spray system that simulates natural icing clouds. The facility is the world's largest refrigerated icing tunnel and has been the site of groundbreaking research in aircraft icing phenomena.

Over the past decade, NASA GRC has made a concerted effort to identify and evaluate additional historic architectural resources. In 1996, GRC performed a cultural resource reconnaissance level survey to inventory its National Register eligible resources (McClane, Miller and Walsh, 1996). Further surveys were conducted in 2000 and 2002 (O'Bannon 2000; Gray & Pape 2002). The survey results have identified an NRHP-eligible historic district in the GRC Central Area. Figure 3-2 illustrates the potential contributing elements to the historic district.

The district is significant for its association with national aeronautics and aerospace programs and important technological and scientific advances in those fields. The function of GRC as an early Center for research on propulsion engines as well as its association with the manned space flight are themes clearly recognizable as contributing to NRHP eligibility Criterion A: "associated with events that have made a significant contribution to the broad patterns of our history," and Criterion C: "properties that embody the distinctive characteristics of type, period, method of construction, represent the work of a master, or possess high artistic values". The proposed historic district contains 112 buildings and structures, of which 60 are considered contributing elements and 52 are considered non-contributing. The periods of significance for the proposed historic district are 1940 to 1970. To date, the historic district remains proposed as the Ohio SHPO has not commented on the surveys.

NASA GRC is proposing to demolish the Propulsion Systems Laboratory Test Cells 1 and 2, and ancillary facilities (Buildings 65, 66, 67, 73, 95, 96, and 97), and the Altitude Wind Tunnel (includes Buildings 7 and 78, and the Vacuum Pump House). Table 3-3 shows the status of each of the buildings with regard to being contributing or non-contributing within the proposed historic district.

TABLE 3-3. RECOMMENDED STATUS OF BUILDINGS PROPOSED FOR DEMOLITION

Ohio Historic Inventory #	Building Name	Building #	Status Within Proposed Historic District	Comments
CUY-4587-15	Microwave Systems Laboratory	7	Contributing	Part of original AERL as the Altitude Wind Tunnel (AWT)
CUY-4608-15	PSL Altitude Chambers	65	Contributing	Built in 1949, integral part of PSL
CUY-4608-15	PSL Access Building	66	Contributing	Integral part of PSL complex
CUY-4608-15	PSL Primary Coolers	67	Contributing	Although built in 1962, this structure is an integral part of PSL
CUY-4608-15	Service Support Building	73	Non-Contributing	
CUY-4608-15	Desiccant Air Dryer	95	Contributing	Although built in 1955, this structure is necessary for tests run in the PSL
CUY-4608-15	PSL Fuel Storage Building	96	Non-Contributing	
CUY-4608-15	PSL Oxidant Storage Building	97	Non-Contributing	Built in 1964

Source: Gray & Pape, 2002

FIGURE 3-2. CONTRIBUTING ELEMENTS TO THE HISTORIC DISTRICT

With the exception of Buildings 73, 96 and 97, all of the facilities are recommended as contributing elements located within the proposed historic district. Additionally, NASA GRC has determined that the Propulsion Systems Laboratory Cells 1 and 2 and the Altitude Wind Tunnel are eligible or potentially eligible for individual listing in the NRHP (GRC 2006j; GRC 2006k). To date, their eligibility has not been confirmed by the Ohio SHPO.

The Altitude Wind Tunnel (AWT) was one of the first facilities built at NASA GRC. It was originally designed to test aircraft piston engines under simulated altitude operating conditions, and later, the tunnel was adapted to test early turbojet and turboprop engines and ramjets. The AWT was a closed circuit tunnel with a test section 6.1 m (20 ft) in diameter. The tunnel drive consisted of a fan 9.4 m (31 ft) in diameter, with a drive motor of 18,000 horsepower. It was capable of producing an air velocity as high as 684 kph (425 mph) at simulated altitudes of 9,144 m (30,000 ft), down to a low of 402 kph (250 miles) per hour at 305 m (1,000 ft). At the time of construction, it was the only known wind tunnel specifically designed to test aircraft engines at simulated altitude conditions. With a test section large enough for both propeller and engine mount, tests in the tunnel assisted in solving cooling problems on the engine for the B-29; the first wind tunnel tests on American jet engine prototypes were conducted here.

After the formation of NASA, the AWT was converted to a vacuum facility to test rockets in 1958 and was used for spacecraft separation tests and the development of the Mercury retro-rockets. A "Gimbal rig" was installed for astronaut training in 1959. In the early 1960s the "space power chamber" was used to test the Centaur rocket. In the early 1980s, there was a failed effort to rehabilitate the tunnel for research on icing, and propeller-powered and vertical/stationary takeoff and landing (V/STOL) vehicles. No significant research work has been done in the tunnel circuit since the Centaur program.

The Propulsion Systems Laboratory (PSL) was built to test full-scale turbojet, ramjet, and rocket engines under simulated altitude conditions. The prototypes for the test chambers of the Propulsion Systems Laboratory were designed by Ben Pinkel and placed in operation in 1947 in the Southwest Wing of the Engine Research Building, known as the four burner area. In 1952, in response to the need to test larger engines, PSL Cells 1 and 2, each 7.3 m (24 ft) long and 4.3 m (14 ft) in diameter, were built and used until 1979. The PSL Cells 1 & 2 were utilized in testing the RL-10 engine for the Centaur Rocket program which was essential to the Apollo Program. In 1969, Cells 3 and 4, 12.2 m (40 ft) long and 7.6 m (25 ft) in diameter, were added at the present site of the PSL in Building 125. The No. 1 and No. 2 Test Cells have been out of service for more than 15 years and research once done in this facility is now handled in PSL No. 3 and No. 4 Test Cells.

3.8.3 Archaeological Resources

Detailed archaeological surveys do not exist for the entire NASA GRC site; however, a 1996 cultural resource survey (Gray & Pape 1996) of portions of the site included an archaeological resource predictive model and sensitivity map. Certain areas of the Center were considered very sensitive for potential archaeological resources. One archaeological site has been reported in the vicinity of Building 501. The “Dean Site” (Site #33CU133) is known from anecdotal reports and is said to have contained relics from the Archaic and Woodland periods. The site may no longer be extant.

In support of the CHIA expansion project, a limited Phase I Archaeological survey was performed in the South Area in 1998, within the area of construction impacts. The survey indicated that no significant or potentially significant archaeological sites are located within that area (Gray & Pape 2000). In 2000, a second Phase I Archaeological survey was performed on areas targeted for facilities relocation. A total of 3.6 hectares (9 acres) at four locations were surveyed. The areas surveyed were scattered throughout the Central, South and West Areas. The survey resulted in the identification of two positive shovel test pits however, the artifacts recovered lacked integrity. No artifacts were recovered from the remainder of the survey areas. Shovel test pits in most areas tested revealed heavily disturbed soils. Given the absence of artifacts and the disturbed nature of the soils, it was determined that no further survey work would be required in conjunction with the airport expansion project.

In 2002, an additional Phase I Archaeological Survey was performed to support changes in plans for the airport expansion project. A total of 0.57 hectares (1.4 acres) were surveyed and no archaeological resources were encountered during the survey.

3.8.4 Traditional Resources

Traditional resources are associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. Traditional resources have not been identified at GRC.

3.9 HAZARDOUS MATERIALS HANDLING AND WASTE DISPOSAL

Hazardous materials and hazardous wastes are managed in accordance with applicable Federal, State, and Local rules and regulations via the *Glenn Research Center, Environmental Programs Manual* (EPM). The EPM contains detailed policies and procedures related to the handling of hazardous materials and hazardous wastes (GRC 2005d).

During 2005, GRC completed a study of the PSL 1 & 2 Complex for the purpose of characterizing and identifying disposal/recycling options for debris and excavated soil that would be generated as a consequence of demolition preparation and execution. The study concluded that materials exceeding applicable GRC EPM guidelines, Ohio VAP standards, and Federal RCRA regulations were present in the Complex's building structures (*e.g.*, tile, insulation, paint, and sumps), equipment (*e.g.*, chillers, transformers) and surrounding soils. Table 3-4 summarizes the location and type of hazardous material identified or presumed to be present (NASA 2006).

This information would serve as the basis for a detailed inventory to identify and quantify hazardous materials to include in abatement specifications for use by the deconstruction contractor. Hazardous materials and building components containing hazardous materials including PCBs in light ballasts, ACM, and mercury would be identified, removed, and disposed of separately.

A site characterization study of similar scope is currently ongoing at the AWT. Preliminary results from a soil sampling indicate that no parameters were detected above applicable Ohio VAP standards or Federal RCRA regulations (Compliance Technologies, Inc. 2006).

TABLE 3-4. TYPE AND LOCATION OF HAZARDOUS MATERIAL IN PSL 1 & 2 COMPLEX

Hazardous Material	Location
Semivolatile Organic Compounds	
Benzo(a)anthracene	Limited surface soil sites throughout Complex
Benzo(a)pyrene	Limited surface soil sites and sediment in pits and sumps throughout Complex
Benzo(b)fluoranthene	Limited surface soil sites throughout Complex
Bis(2-ethylhexyl)phthalate	Limited surface soil sites and water in pits and sumps throughout Complex
Polychlorinated biphenyls in equipment	Buildings 65, 66, 67, 73, 96 and 97
Volatile Organic Compounds	
Chloroethane	Water in pits and sumps throughout Complex
Chlorofluorocarbons in equipment	Buildings 65, 66 and 67
Dichloromethane	Water in pits and sumps throughout Complex
Metals and Metal-bearing Material	
Antimony	Water in pits and sumps throughout Complex
Arsenic	Sediment in pits and sumps in throughout Complex
Cadmium	Water and sediments in pits and sumps throughout Complex
Chromium	Water and sediments in pits and sumps throughout Complex
Lead and lead-based paint	Buildings 65, 66, 67, 73 and 96; limited surface soil sites and water and sediments in pits and sumps throughout Complex
Mercury	Near floor drains throughout the PSL 1&2 Complex; based on previous GRC demolitions, mercury is assumed to be present throughout floor drainage plumbing; also present in limited surface soil sites and water and sediments in pits and sumps throughout Complex
Selenium	Sediments in pits and sumps throughout Complex
Silver	Sediments in pits and sumps throughout Complex
Thallium	Limited surface soil sites and sediments in pits and sumps throughout Complex
Zinc	Water in pits and sumps throughout Complex
Other	
Asbestos containing material	Buildings 65, 66, 67 (assumed), 73 and 96; limited surface soil sites throughout Complex

Source: NASA 2006

3.10 TRANSPORTATION

The transportation network in the vicinity of GRC consists of two major highways, Interstate-480 and Interstate-71, which provide automobile access and serve as major feeders to the CHIA. These are heavily-traveled roads which are often congested during rush hour. There are many

secondary roads also serving the area. Although most commuting to GRC is by motor vehicle, the Greater Cleveland Regional Transit Authority does provide limited public transportation to GRC (GRC 2005a).

The Main Gate to GRC is located on Walcott Road, directly off Route 17 (Brookpark Road). The road network at GRC allows for direct access to AWT and PSL. AWT is located on Ames Road and PSL is located on Walcott Road. Parking is available at both locations (GRC 2005a).

3.11 ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898 (1994), *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

In response to the EO, GRC developed an Environmental Justice Implementation Plan (Jones 1996) and a Supplement to the Environmental Justice Implementation Plan (SAIC, 1997). The GRC updated the Environmental Justice Implementation Plan in 2004.

4 ENVIRONMENTAL CONSEQUENCES

4.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1.1 Land Use

During demolition, all occupants of adjacent on-site spaces would be impacted. There would be on-site inconveniences from modified parking and pedestrian patterns to high intermittent and general background noise. However, any impact or displacement of near-by occupants would be temporary and any on-site occupants would be relocated in a timely manner. No long-term impacts would be anticipated to neighboring on-site facilities and no disturbance would be expected to previously undeveloped areas. Furthermore, removal of the AWT and PSL facilities and structures would result in a positive impact by providing real estate for establishing new land use.

4.1.2 Climate and Air Quality

Air quality issues are largely associated with whether or not implementation of the Proposed Action has the potential to impact air quality. Impacts may be related to construction equipment emissions, fugitive dust emissions from construction and demolition activities, and increased use of vehicles from any extended commutes.

Air quality impacts from demolition activities include increased dust and airborne particulates caused by grading, filling, removal, and other construction activities. Dust impacts would be minimized through standard dust control measures such as watering. After demolition is complete, dust levels are expected to return to near existing conditions. Air quality impacts may also result from emissions from construction equipment and possibly from traffic stopped at intersecting roadways or on potential detour routes. These impacts are expected to be temporary.

Dust from demolition activities is not expected to significantly contribute to ambient concentrations of suspended particulate matter. Demolition contractor(s) would have to comply with the regulations requiring all reasonable precautions be taken to minimize fugitive dust emissions.

Demolition would require the use of heavy trucks, hydraulic jacks, and smaller equipment such as generators and compressors. Such equipment can be sources of nitrogen oxides, $PM_{2.5}$, and odorous gases. However, due to the limited use of such equipment, the impact of these emissions would be minimal.

It is probable that the existing structures to be demolished contain asbestos, lead-based paint and possibly mercury. Contractors would have to comply with all Federal, State and local regulations, which outline best practices for the handling of these materials. The GRC has existing plans for the handling of asbestos, lead based paint, polychlorinated biphenyls (PCB's) and mercury (see GRC Environmental Programs Manual (EPM) (GRC 2005d). See also Section 5.1 for best management practices.

Construction equipment and material hauling can affect traffic flow in a project area. Scheduling haul traffic during off-peak times (e.g., between 9 a.m. and 4 p.m.) would minimize effects on traffic and indirect increases in traffic-related emissions.

Traffic from construction workers is not expected to substantially increase idle emissions on-site.

As indicated in Section 3.2, Cuyahoga County is designated as an attainment area except for $PM_{2.5}$ and 8-hour ozone standards (moderate non-attainment). Cuyahoga County is in maintenance for carbon monoxide. A General Conformity Applicability Analysis was completed for the demolition activities (see Appendix B for the details). Table 4-1 provides the estimated direct and indirect emissions based on the information provided in Chapter 2. More detailed information on the Conformity Applicability Analysis can be found in Appendix B.

TABLE 4-1. ESTIMATED DIRECT AND INDIRECT EMISSIONS

	Emissions (tons per year)				
	VOC	CO	NO_x	PM	SO_x
Construction Equipment	4.49	41.04	62.90	4.59	9.71
Debris Removal	0.30	1.54	1.48	0.58	0.01
Commuters	0.31	2.33	0.32	0.01	0.02
Total	**5.10**	**44.91**	**64.70**	**5.19**	**9.73**

Emissions associated with demolition activities would be relatively short term and would end with the completion of the demolition activities. Impacts are expected to be imperceptible relative to background variations. In addition the mitigation measures found in Section 5.1 of this EA would serve to minimize airborne emissions.

4.1.3 Water Resources

4.1.3.1 Surface Water

The Proposed Action would not have a significant impact on surface water at NASA GRC based on Best Management Practices (BMPs). Utilization of BMPs would reduce the negative effects of demolition. Post-demolition plans for the PSL call for the area to be seeded with native grass (an area of approximately 4,600 m^2 (~50,000 ft^2)). Post-demolition plans for the AWT call for the area to be paved (an area of approximately 3,200 m^2) (~35,000 ft^2) .

Current and historical National Pollution Discharge Elimination System (NPDES)-permitted discharges from GRC appear to have minimal impact on the water quality of the Rocky River. This was confirmed by a study, which found no significant differences in the biological communities upstream and downstream from the Airport (GRC 2005a). GRC stormwater discharges are bracketed by and often mingled with those from the Airport. The Environmental Justice Implementation Plan (GRC 2005a) concluded there was "...no reasonable likelihood of substantial off-site water quality impacts from normal operations [and there is] ... no reasonable likelihood of significant impacts to water quality from present or past actions [of solid and hazardous waste programs]."

Construction and demolition projects of one acre or larger in size require the construction contractor to submit a Storm Water Pollution Prevention Plan (SWP3) to NASA GRC, which is subsequently submitted to the EPA. The SWP3 requires the contractor to set time frames when soil will be restabilized after being disturbed and the type of stabilization used. The contractor is also required to conduct weekly and storm event inspections and provide the maintenance necessary to keep their BMPs working properly until the site reaches 70% stabilization. The SWP3 plan spells out in detail what BMPs the contractor plans on using to control erosion and sediment loss at the construction site. Minimum BMPs to be used include: construction site entrances, silt fencing, storm drain protection, straw mulching and reseeding of bare surfaces as

soon as possible. Several post demolition BMPs to be used include the use of permeable pavers and bio-retention areas such as rain gardens. Use of these BMPs would result in an increase of permeable surface area at GRC. This would allow for greater infiltration of rain into the soil and consequently reduce stormwater runoff and pollution. All three of these outfalls are monitored and sampled monthly.

4.1.3.2 Groundwater

The Proposed Action would not have a significant impact on groundwater at GRC. The implementation of the Proposed Action with the use of BMPs mentioned in Section 4.1.3.1 would result in an increase of permeable surface area at GRC. This would allow for greater infiltration of rain into the soil and potentially into the groundwater.

4.1.4 Ambient Noise

The Proposed Action would not have a significant impact on ambient noise at NASA GRC. As discussed in Chapter 3, CHIA is the primary generator of ambient noise in the area and this noise would not be increased or abated by the Proposed Action. There would be an increase of localized noise generated by demolition equipment such as cranes and bulldozers. This demolition noise would not be continuous and would only occur at times of demolition work. This could result in a temporary minor adverse impact on tenants of the buildings and offices near the demolition sites. The level of this impact would depend on the noise insulating ability of the surrounding buildings. Table 4-2 shows the sound levels produced by the types of construction equipment anticipated to be used for the Proposed Action at a distance of 15.24 meters (50 feet).

TABLE 4-2. EQUIPMENT TYPE AND NOISE LEVEL

Equipment Type	Typical Equipment at 15.24 m (50 feet) (in dBA)
Concrete Breaker	82
Dozer	80
Generator	78
Loader	79
Paver	88
Water Pump	76
Air Compressor	81
Trucks	88
Backhoe	85
Concrete Pump	82
Concrete Vibrator	76

Source: EPA 1971

4.1.5 Geology and Soils

All areas within the Proposed Action have been previously disturbed. It is anticipated that there would not be a significant amount of excavation required below grade. The handling of excavated soils would be performed according to the Demolition Design Work Plan, which

would be consistent with applicable sections of the GRC EPM and relevant local, state, and Federal requirements. Contaminated soils at both PSL and the AWT would be sampled and analyzed prior to final disposition. The contaminated soil would be properly managed according to the EPM (GRC 2005d). A "Soil Determination Checklist, Form and "Site Specific Workplan (for Contaminated Waste Soils Operations)" would be prepared by NASA prior to removal of contaminated soils, and for the entire project, a "Site Specific Health and Safety Plan" would be prepared by the Contractor. All borrowed fill and backfill material would be tested for the presence of contaminants. Material determined to be not clean would be rejected.

Soil grading would not substantially alter existing soil conditions at AWT or PSL because these areas have been previously disturbed. To minimize impacts, dust and soil erosion control measures would be implemented (see Section 5.1 for mitigation measures).

With these procedures in place, impacts resulting from demolition activities would be expected to be insignificant.

4.1.6 Natural Resources and Threatened and Endangered Species

Any natural vegetation in the immediate vicinity of the AWT and PSL consists primarily of invasive species or natural vegetation that is extensive at GRC. Lawn and landscaped vegetation (primarily ornamental, ground cover, and shade trees) would be removed from the AWT and PSL sites. Fugitive dust from demolition is likely to settle on vegetation in nearby areas—reduced by application of dust control measures and would have no adverse impacts. Although vegetation would be impacted by demolition vehicles and equipment, debris, dust, and grading activities, none of these impacts are considered significant or expected to occur on previously undeveloped areas. At completion of the Proposed Action, demolition areas would be landscaped or paved to have similar characteristics as the current context. Other disturbed areas would be reseeded with native vegetation to inhibit the spread of invasive weeds.

Wildlife that inhabits the proposed demolition areas consist of species already accustomed to human-dominated environments. It is expected that these species would continue to utilize the surrounding areas after implementation of the Proposed Action. During demolition, noise levels may be elevated in the immediate vicinity of AWT and PSL. Less mobile species and fleeing species could be impacted as a result of demolition activities; however, should mortalities occur, they would likely be isolated instances and would not result in long-term impacts to populations of wildlife species. Considering the urban setting of the GRC, any migratory bird species currently utilizing this area for forage or shelter are likely to be well-adapted to the urban nature of the site. It is unlikely they would be substantially affected by the temporary demolition activities. In addition, no Federally or State listed, proposed or candidate, threatened, or endangered species are expected to be affected by the Proposed Action.

4.1.7 Socioeconomics

Only a small number of contracted workers (approximately 12 for AWT and 12 for PSL) would be involved in the demolition actions at any one time. Estimated project duration is one year. No substantial change would be expected in the number of GRC site personnel as a result of the Proposed Action and no discernible impact to employment levels within Cuyahoga County is expected. The estimated minimum cost to complete the Proposed Action is approximately $5 million, including $3 million for AWT and $2 million for PSL (GRC 2004b; GRC 2004c). The

demolition of these sites would eliminate deferred maintenance costs and provide real estate for future structures or parking lots.

4.1.8 Cultural Resources

As a Federal facility, NASA is required to manage its cultural resources in accordance with Sections 106 and 110 of the National Historic Preservation Act (30 CFR 800). Section 106 requires that Federal agencies identify and evaluate their historic properties and assess the affects that an undertaking may have on an historic property. If an adverse effect would occur, the law requires that the Federal agency consult with the State Historic Preservation Office (SHPO) and if needed, the Advisory Council on Historic Preservation (ACHP) to reduce, avoid, or mitigate the adverse effect.

Section 110 of the Act requires that Federal agencies establish preservation programs to identify, evaluate, protect, and nominate to the National Register historic properties under their ownership or control, whether they are of significance at the local, State, or National level. Section 110 also requires that the heads of all Federal agencies assume responsibility for the preservation of historic properties which are owned or controlled by such agency. Prior to acquiring, constructing, or leasing buildings for purposes of carrying out agency responsibilities, each Federal agency shall use, to the maximum extent feasible, historic properties available to the agency. Each agency shall undertake, consistent with the preservation of such properties and the mission of the agency and the professional standards established pursuant to Section 101(g) of the NHPA, any preservation, as may be necessary to carry out the Section 110 requirements.

4.1.8.1 Architectural Resources

The Proposed Action is the demolition of the AWT and PSL at NASA GRC. As described in Chapter 3, both of these facilities are unique historical properties and their value is recognized as contributing resources to the proposed GRC Central Area historic district that may be eligible for listing in the National Register of Historic Places (NRHP). In addition to being contributing resources, NASA GRC has determined that the facilities are eligible or potentially eligible for individual listing in the NRHP. The NASA GRC Federal Preservation Officer (FPO) has been in consultation with the Ohio Historic Preservation Office (OHPO) regarding the Proposed Action. The demolition project was initially brought to the OHPO's attention in a May 2004 letter which identified the project as a Federal undertaking subject to compliance with Section 106 requirements (see Appendix A).

In November of 2005, the OHPO visited the GRC for a tour of the facilities and to discuss the proposed demolition project. The tour of the facilities identified that the facilities are not utilized, in various states of deterioration, and they will become safety hazards if their deterioration is not addressed. During the meeting, it was discussed that NASA does not have the budget to maintain the facilities, and that alternatives to demolition, such as adaptive reuse or rehabilitation are cost prohibitive or not feasible. It was also discussed that while the proposed demolition would impact NASA's cultural resources and result in a lost of the facilities, the history of the structures could be recovered through mitigation measures developed by GRC in consultation with the SHPO. An agreement document such as a Memorandum of Agreement (MOA) will be developed between GRC and the SHPO that will specify the mitigation measures required for the demolition to occur.

In consultation with the OHPO, NASA GRC would develop mitigation measures to preserve the history of the facilities and mitigate the effects of demolition upon the proposed historic district. As described in Chapter 3, NASA GRC demolished the National Historic Landmark Rocket Engine Test Facility (RETF) in 2001 and numerous mitigation measures were carried out to minimize the adverse effects of the demolition. Similar mitigation measures could be carried out for the AWT and PSL facilities to include:

- Recordation of the AWT and PSL to National Park Service Historic American Engineering Record (HAER) standards.
- Photographs, videotapes, films and written records which describe the two facilities.
- Development of a web-based presentation on the two facilities, their research programs, video clips, and written materials.
- Videotape interviews of persons who worked in the AWT and PSL and on associated research programs.

As the two facilities are character-defining elements of the proposed historic district, additional mitigation measures may be developed to preserve the historical importance of the district. The FPO will continue consultation and coordination with the OHPO and if needed, the ACHP regarding the Proposed Action to resolve adverse effects and ensure compliance with Section 106 requirements.

In addition to consultation and coordination with the agencies mentioned above, in April 2006, GRC held a Community Awareness Meeting to solicit comments from the public on the proposed demolition project. The meeting was announced through a GRC press release sent to various, local, statewide and regional media representatives. At the meeting, information was made available on the history of the AWT and PSL facilities, a description of the demolition process, the environmental impacts of the project, and examples of proposed mitigation measures. As this meeting had minimal attendance, NASA GRC may hold additional meetings to solicit comments to ensure that mitigation measures properly address any public concerns over the demolition of the facilities.

4.1.8.2 Archaeological Resources

The Archaeological Resources Protection Act (ARPA) preserves and protects resources and sites on Federal and Indian lands by prohibiting the removal, sale, receipt, or interstate transportation of archaeological resources obtained illegally (i.e., without permits) from public or Indian lands. ARPA permits are not required for archaeological work conducted by or on behalf of GRC; however, the specific requirements of ARPA may be addressed in contract documents or other documentation authorizing the work.

For activities on Federal lands, the Native American Graves Protection and Repatriation Act (NAGPRA) requires consultation with “appropriate” Indian tribes or Native Hawaiian organizations prior to the intentional excavation or removal after inadvertent discovery, of several kinds of cultural items, including human remains and objects of cultural patrimony. Native American cultural items include human remains, associated funerary objects, unassociated funerary objects, sacred objects, and cultural patrimony. Native American cultural items are the property of Native American groups.

For activities on Native American or Native Hawaiian lands, which are defined in the statute, NAGPRA requires the consent of the Indian tribe or Native Hawaiian organization prior to the removal of cultural items. The law also provides for the repatriation of such items from Federal agencies and federally assisted museums and other repositories. Agencies must inventory Native American cultural items, repatriate Native American cultural items, and consult with Native American groups about permits to excavate.

No known archaeological sites exist at or near the location of the AWT and PSL. In addition, the demolition process would involve incidental soil disturbance in previously disturbed areas. As such, no impacts to archaeological resources would occur as a result of the Proposed Action.

In the event that archaeological resources are unexpectedly discovered during the demolition process, the procedures outlined in Section 6.8 of the GRC Cultural Resource Management Plan, *Protocol for Unanticipated Discovery of Cultural Materials,* will be implemented. The protocol includes the following:

- If any member of the demolition or other field crew believes that he or she has discovered a historic property, all work adjacent to the discovery will stop, and the work supervisor will be immediately notified. The area of work stoppage will be determined in consultation with NASA GRC's Public/Cultural Programs Manager (P/CP Mgr.) and will be adequate to provide for the security, protection, and integrity of the cultural materials.
- The work supervisor will take appropriate steps to protect the discovery site and summon the P/CP Mgr. At a minimum, the immediate area of the discovery site will be secured. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not be re-started until treatment of the discovery has been completed.
- The P/CP Mgr. will determine whether the discovery is potentially eligible for listing in the National Register of Historic Places.
- If the discovery appears to be eligible for listing in the National Register of Historic Places, the P/CP Mgr. will immediately contact the Ohio SHPO to seek consultation regarding appropriate treatment. If the SHPO determines that the discovery is an eligible prehistoric or historic Native American deposit, then NASA will consult with the affected Indian Tribes to determine potential cultural heritage significance and the appropriate treatment of the find. Treatment measures may include mapping, photography, limited probing and sample collection, or other activity.
- The P/CP Mgr. will prepare a report on the methods and results of the treatment measures within 4 months of completion of the measures. The report will be addressed to the SHPO. NASA will provide a review copy of the draft report to the SHPO and affected Indian Tribes. After a 30-day review period, NASA will make revisions that take into account review comments and will provide a final copy of the final report to each of these parties.

In the event that human remains are encountered during the proposed demolition, the procedures outlined in Section 6.9 of the GRC Cultural Resource Management Plan, *Protocol for Treatment of Human Remains,* will be implemented. The protocol includes the following:

- All ground disturbing activity within 9 m (30 ft) of the remains will be halted immediately.
- The GRC staff or contracted archaeologist will be immediately contacted and will assume responsibility for assuring that this protocol is followed.
- All skeletal material will be left in place until a designated professional archaeologist or medical examiner directs its removal.
- The Cuyahoga County Medical Examiner's Office will be contacted immediately and asked to determine whether the remains are part of a potential crime scene. A forensic anthropologist may be required to determine whether the remains are of Native American ancestry.
- The SHPO will be contacted by telephone and informed of the discovery. The SHPO will be kept informed of all discussions regarding the remains until their final status is resolved.
- The listed federally recognized Indian tribes will be contacted. Representatives of these groups will be invited to be present during the Medical Examiner's inspection of the remains.
- If the Medical Examiner determines the remains to be historical and Indian, the interests of the Tribes become paramount.
- If the remains are determined to be Indian, no analyses – beyond inventory – will be performed without written consent of the Tribes.
- The remains will not be transported off site, except to protect them from imminent damage.
- The remains will not be transported beyond the borders of the state of Ohio without written consent from the SHPO and the Tribes.
- If the Medical Examiner determines the remains to be historical and non-Indian, NASA will use historic documentation in an attempt to locate familial descendants. If descendants are located, NASA will allow reburial on utility property if that is requested.
- The location of reburials will be noted on planning maps to prevent future disturbance. These maps will not be available to the public.
- NASA will treat areas of known burials, both *in-situ* and reburials, with the respect accorded any cemetery.

4.1.8.3 Traditional Resources

No impacts to traditional resources would occur as a result of the Proposed Action since there are no American Indian traditional resources located at NASA GRC.

4.1.9 Hazardous Materials

Removal of contaminated building structures, equipment and soil would be accomplished by means of an approved Demolition Design Work Plan, which would be consistent with applicable GRC EPM policies, Federal, State and local requirements, and best construction management practices. In addition, asbestos-containing materials and chlorofluorocarbons would be handled only by personnel with the required training and State certification or licensing. The GRC Environmental Branch and Waste Management Team would provide guidance and oversight for waste management, reuse, and final disposal of all impacted materials and to maintain compliance with all chapters of the EPM (GRC 2005d). Mitigation measures found in Section 5.1 of this EA are best management practices to minimize or reduce the potential consequences from hazardous materials. With these measures in place, no impacts would be expected from hazardous materials as a consequence of demolition activities.

4.1.10 Transportation

Implementation of the Proposed Action would not alter traffic circulation on most of GRC. Haul routes for proposed demolition have not been established, but would be routed on the primary roads in and out of GRC, to the extent possible. Access and circulation would be maintained through use of appropriate detours and signage. Demolition truck traffic and workers commuting to the project sites would generate minor increases in vehicle trips per day on GRC roadways and increase congestion at the entrance gates at peak commuting times. The increased trips and additional heavy truck traffic mixed with smaller passenger vehicles may interrupt the flow of traffic on primary access roads, such as Route 17 (Brookpark Road) and Walcott Road (see Figure 2-1).

At the demolition sites, temporary lane closures would be necessary during some activities. These impacts would be short-term and temporary, occurring only for select demolition periods. Heavy demolition equipment and trucks could lead to degradation of road surfaces over an extended period of use, particularly on roads that are not designated for high volume and heavy truck traffic. It is also expected that pedestrian traffic and the present pattern of parking at AWT and PSL would be substantially disrupted. In some instances the neighboring sidewalks would be temporarily closed.

To minimize the impacts described above, a health and safety plan would be developed to identify measures to ensure safety and access, and to maintain adequate circulation. Examples include establishing haul routes, speed limits, and procedures to minimize peak hour traffic congestion, and any special procedures related to public safety. After completion of the on-site activities, it is anticipated that there will be at least as much parking available as currently exists and most likely more parking spaces until long-term uses of the sites are developed.

4.1.11 Environmental Justice

In response to Executive Order (EO) 12898 (1994) Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, GRC developed an Environmental Justice Implementation Plan (Jones 1996) and a Supplement to the Environmental Justice Implementation Plan (SAIC, 1997). Five Census tracts were identified within an 8 km (5 mi) region of influence (the area consistent with Council on Environmental Quality's criteria for identifying minority and low-income populations). The GRC's plan concluded that "no

substantial or disproportionate environmental impacts are currently experienced by any community at GRC". The GRC updated the Environmental Justice Implementation Plan in 2004.

The Proposed Action of demolishing the AWT and PSL would not disproportionately impact minority or low-income populations. Figure 4-1 provides the region of influence for possible minority areas near the Lewis Field based on the 2000 census data and for Figure 4-2 provides possible low-income areas near Lewis Field based on the 2000 census data.

4.1.12 Cumulative Impacts

Cumulative impact is defined as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other action. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7). In accordance with NEPA, a discussion of cumulative impacts resulting from projects that are proposed, under construction, or recently completed is required.

Past activities would include all of the construction and research activities at the GRC which began in 1941. On-site technical and support facilities have changed continuously throughout the years and the campus-like setting now includes a diverse array of laboratories, office buildings, research and test stations, and support facilities (GRC 2005a; ERD 2005).

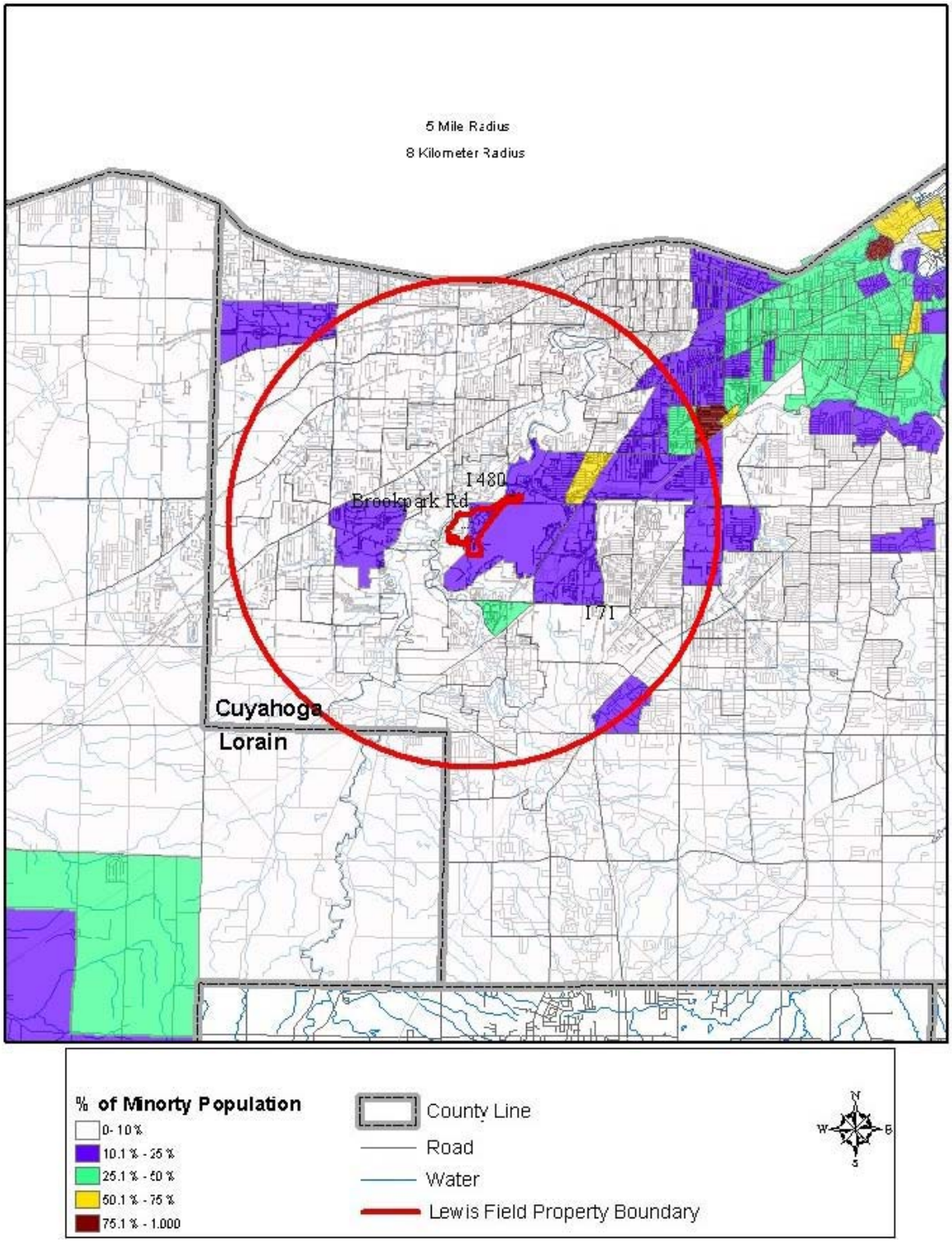
Foreseeable future activities include GRC-specific projects and activities as well as those potentially occurring surrounding the GRC.

Short- and long-term planning efforts at or in the immediate vicinity of the GRC include the Proposed Action as well as several others, including Cleveland Hopkins International Airport expansion (including the Altitude Combustion Stand with construction continuing through mid-2007) (GRC 2006d).

Reasonably foreseeable actions include two major projects: repairing Utility Tunnel Buildings 23 and 77 and demolition of Building 28 (Logistics Management Building). The GRC is in the process of undergoing a site-wide comprehensive land use plan, so it is not entirely clear how the Proposed Action might affect or be affected by the results of the planning.

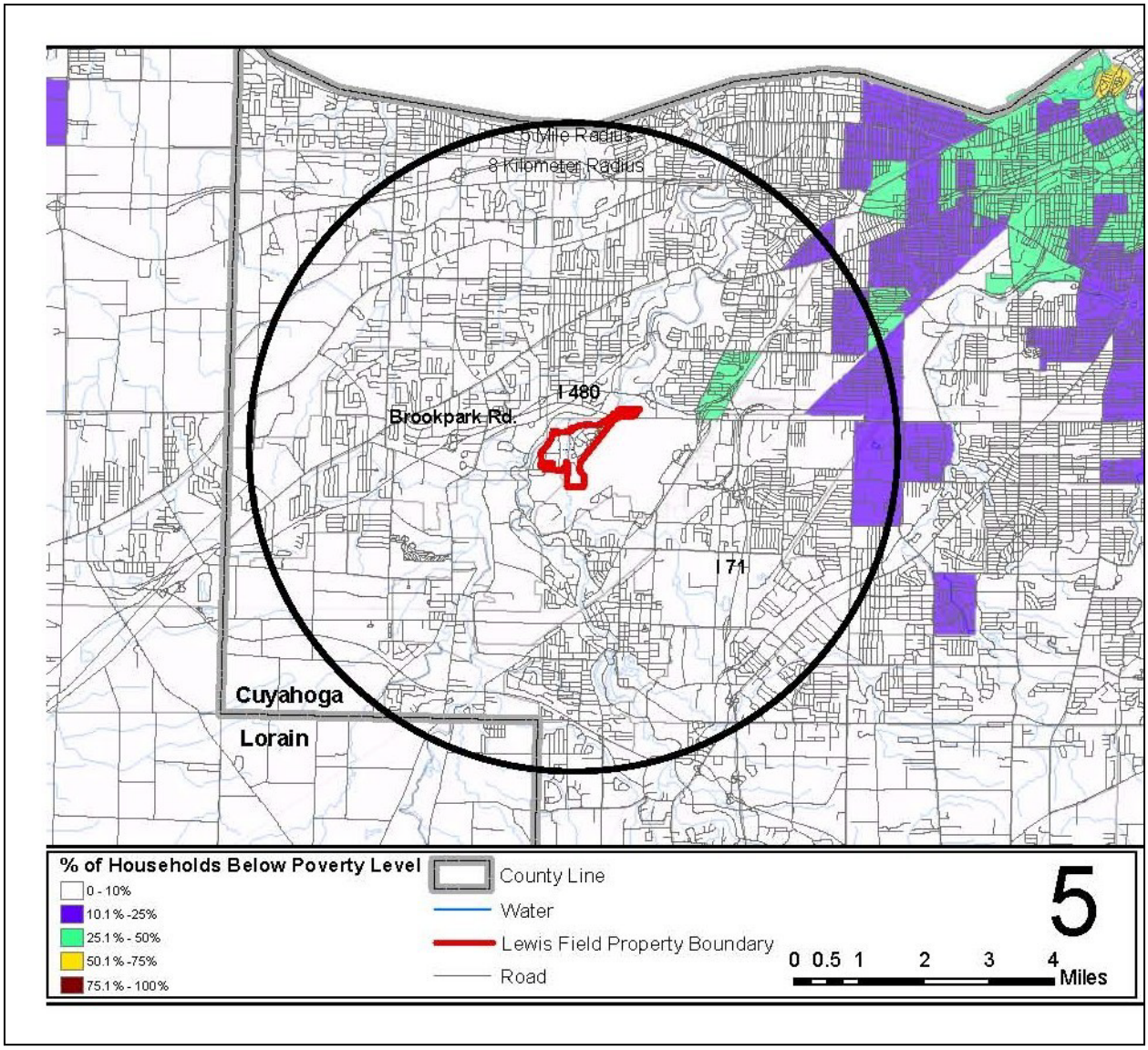
In June, 2006, it was announced that NASA Glenn Research Center had secured the responsibility for management of the Crew Exploration Vehicle's service module, which will include management and budgeting for the project. This work will secure the center's future in the near term, and signals a shift in priority for the center from aeronautical research to space exploration, aligning itself closer with NASA's new mission.

Past and present activities have had a minor continuing impact on air quality. Reasonably foreseeable future activities have similar impacts. The demolition would employ mitigation measures and would have a very small incremental impact to air quality. Overall, the cumulative impacts to air quality are small.



Source: GRC 2005a

FIGURE 4-1. POSSIBLE MINORITY AREAS NEAR LEWIS FIELD BASED ON 2000 CENSUS



Source: GRC2005a

FIGURE 4-2. POSSIBLE LOW-INCOME AREAS NEAR LEWIS FIELD BASED ON 2000 CENSUS

The impact of past, present, and reasonably foreseeable future activities on the hydrologic system is generally small including the demolition activities at the GRC. The cumulative impact on hydrology and water quality is not significant.

The impact of noise from past, present, and reasonably foreseeable future activities is generally small. The demolition projects would have a small, but temporary incremental impact. Overall noise conditions within the area would be low.

The impact of past and present activities on geology and soils has been substantial. The impact of foreseeable future activities is anticipated to be small. The demolition activities associated with the Proposed Action would add a small and not significant incremental impact.

From a cumulative perspective, the impact of past, present, and reasonably foreseeable future activities on biological resources would be insignificant. The composition of the original vegetation and biological resources at Lewis Field is unknown (GRC 2005a). The GRC is currently in a highly urbanized area with the CHIA on its east border. This massive airport prevents the migration of many species into Lewis Field (GRC 2005a).

Only small numbers of workers would be involved in the Proposed Action at any one time. Therefore, no incremental socioeconomic impact would be expected from the Proposed Action.

From a cumulative perspective, the impact of past and present activities on the cultural resources at GRC is small and non-significant. The incremental impact of the Proposed Action is substantial and adverse. However, mitigation measures developed for the demolition of the culturally significant buildings and made part of the NHPA Section 106 Memorandum of Agreement would minimize the impact from the demolition. These measures could potentially provide beneficial impacts, including community outreach, cultural stewardship, and provide an outlet for cultural interpretation.

Waste generation and disposal resulting from the Proposed Action are not expected to be considerable and would not substantially affect any associated operations or disposal sites; therefore, the Proposed Action is not expected to result in any cumulatively significant impacts. The Proposed Action would return all associated areas to level ground for potential reuse.

The incremental impact on transportation from the demolition activities would be small.

The potential incremental impacts from the Proposed Action would not be expected to contribute substantially to the cumulative impacts at GRC.

4.2 DESCRIPTION OF THE NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the AWT and PSL would not be demolished, and the historical value of the properties would be retained in physical form, including their value as contributing elements to the proposed historic district. In addition under the No-Action Alternative, the purpose and need for NASA's Proposed Action would not be met. NASA's continuing neglect of these facilities would have an adverse effect with continued deterioration.

Implementation of the No-Action Alternative would have no impact on NASA GRC's historic resources. However, it should be noted that both of the facilities have been out of service for many years and they are in poor repair. Under the No-Action Alternative, NASA GRC would need to perform maintenance on the exterior of the facilities in order to ensure the structural integrity remains intact for safety and aesthetic purposes. Given the Center's limited budget, this alternative would expend valuable financial resources on facilities that are no longer useful to support NASA's mission.

The other potential impacts described in this EA (see Section 4.1) would not occur. For example, there would be no temporary noise disturbance from the demolition activities. In addition, real estate for future structures or parking lots would be not available should the buildings not be demolished.

5 MITIGATION AND MONITORING MEASURES

5.1 BEST POLLUTION PREVENTION PRACTICES

The objective of best pollution prevention practices is to prevent particulate matter from becoming airborne. The Glenn Research Center follows best practices contained in the Environmental Programs Manual (GRC 2005d).

Practices could include:

1) Use of water or non-toxic chemicals to control dust around material stockpiles during demolition, construction, grading of roads, or clearing of land.

2) Limit the driving speed of construction vehicles.

3) Enclose material stockpiles when the use of water or chemicals is not sufficient to prevent particulate matter from becoming airborne.

4) Install and use hoods, fans, and fabric filters to enclose and vent particulates from dusty materials.

5) Provide adequate containment during sandblasting or other similar operations.

6) Cover open-bodied trucks that transport materials likely to become airborne.

7) Promptly remove from paved streets dirt or other material that could become airborne.

5.2 CULTURAL RESOURCE MITIGATION MEASURES

5.2.1 Historic Mitigation Measures and Documentation for Attitude Wind Tunnel (AWT)

The technology tested and developed by National Advisory Committee for Aeronautics (NACA) and NASA in the AWT and the Space Power Chamber are more important than the structure. Properly compiling historical scientific and engineering documents is important to NASA. Because of this, NASA is planning the following Historic Mitigation and Documentation for the AWT:

1) NASA GRC will prepare and archive Level II Historic American Engineering Record (HAER) documents of the AWT complex. These documents will summarize the construction, historical context, technological significance, and a physical description of the AWT. Included in this documentation will be selected photographs and architectural drawings from NASA's files.

2) NASA GRC will collect, appraise, and maintain a collection of historically significant documents that will become a permanent record of the AWT. These documents may

include correspondence, architectural drawings, maps, scientific or engineering publications, and related materials.

3) NASA GRC will update the photographic images of the AWT by digitizing unscanned negatives and photographs and uploading them to the GRC Imagenet database. NASA will perform several 360 degree images of the AWT before demolition begins. NASA will compile film and video of tests performed in the AWT and have the film/video digitized. From the above digitized files, NASA will produce a CD-ROM or DVD that will include photographs, panoramic photographs, video clips, and scanned documents. This disc may supplement the monograph or be distributed separately.

4) NASA GRC will conduct oral interviews will be conducted with NASA retirees, facility and program managers, and others. These interviews will be recorded and transcribed. Selected interviews will be videotaped. NASA will produce a documentary video that would describe the facility, its history, and research programs. The documentary may include some of these interviews**.**

5) NASA GRC will publish a monograph recording the history of the AWT. The monograph will include photographs to illustrate the narrative text.

6) NASA GRC will produce museum quality display boards that show the history of the AWT and the technology that was developed from the testing performed there. NASA GRC will showcase this display material at an appropriate campus tour stop or at the Visitor's Center, in order to make the interpretive material available to the public.

7) NASA GRC will create a web site with public access for the AWT through the NASA GRC History Office website. Historic photographs of the construction and testing within the Test Section, the tunnel, and the Space Power Chamber will be available for viewing. Photographs of the current state of the AWT and photographs documenting the demolition of the AWT will also be available for viewing. The text from the monograph will also be available for viewing.

5.2.2 Historic Mitigation Measures and Documentation for PSL (Test Cells 1 & 2)

NASA is planning the following Historic Mitigation and Documentation for PSL (Test Cells 1 & 2);

1) NASA is investigating feasibility of retaining one test chamber and setting it up as interpretive educational site and tour stop. If this is feasible, NASA will produce museum quality display boards that show the history of PSL (Test Cells 1 & 2) and the technology that was developed from the testing performed there.

2) A Community Awareness meeting was held on April 27, 2006 on the GRC Campus. Meeting announcements were sent to local public libraries (Fairview Park, North Olmsted, Brookpark, and Cleveland Public), the Sun Post/Sun Herald, and the Cleveland Plain Dealer. Announcements were sent to NASA retirees and an announcement was

published in GRC's Aerospace Frontiers. The meeting discussed the history of PSL (Test Cells 1 & 2), the demolition process, the environmental impact, and the historical mitigation process. The meeting ended with a Question and Answer session. The meeting was video taped. Pamphlets with a brief description and history of PSL (Test Cells 1 & 2) were made available to the public.

3) A monograph will be published recording the history of the PSL (Test Cells 1 & 2). The monograph will include full-sized photographs.

4) A web site with public access will be developed for PSL (Test Cells 1 & 2). Historic photographs of the construction and testing within the test chamber will be available for viewing. Photographs of the current state of PSL (Test Cells 1 & 2) and photographs documenting the demolition of PSL (Test Cells 1 & 2) will also be available for viewing. The text from the monograph will also be available for viewing.

5) HAEB/HAERS documents of the PSL (Test Cells 1 & 2) will be prepared and archived. These documents will summarize the construction, historical context, technological significance, and a physical description of the facility. Included in this documentation will be selected photographs and architectural drawings from NASA's files.

6) NASA will collect, appraise, and maintain a collection of historically significant documents that will become a permanent record of PSL (Test Cells 1 & 2). These documents may include correspondence, architectural drawings, maps, scientific or engineering publications, and related materials.

7) NASA will update the photographic images by digitizing unscanned negatives and photographs and uploading them to the GRC Imagenet database. NASA will perform several 360 degree images of PSL (Test Cells 1 & 2) before demolition begins. NASA will compile film and video of tests performed in the test chambers and have the film/video digitized. From the above digitized files, NASA will produce a CD-ROM or DVD that will include photographs, panoramic photographs, video clips, and scanned documents. This disc could supplement the monograph or be distributed separately.

8) Oral interviews will be conducted with NASA retirees, facility and program managers, and others. These interviews will be recorded and transcribed. Selected interviews will be videotaped.

9) NASA will produce a documentary video that would describe the facility, its history, and research programs. The documentary may include oral interviews.

6 AGENCIES AND PERSONS CONSULTED

FEDERAL AGENCIES

Advisory Council on Historic Preservation – Mr. Tom McCullough
National Park Service
NASA History Office
NASA Glenn Research Center – Ms. Trudy Kortes
NASA Glenn Research Center – Mr. Joseph Morris, Chief Architect
NASA Glenn Research Center – Mr. Leslie Main, Facility Preservation Officer
NASA Glenn Research Center – Mr. Robert Houk, Technical Project Engineer for AWT Complex Demolition
NASA Glenn Research Center – Mr. Eric Patton, Technical Project Engineer for PSL Demolition (Test Cells 1 & 2)

STATE AGENCIES

Ohio State Historic Preservation Office – Ms. Rachel M. Tooker, State Historic Preservation Officer
Ohio State NEPA Point of Contact – Mr. Graham E. Mitchell (Chief, Office of Federal Facility Oversight, Ohio Environmental Protection Agency

CITIES

Brook Park
Cleveland
Fairview Park
North Olmsted

LOCAL ORGANIZATIONS

Cleveland Landmarks Commission
Cleveland Restoration Society
NASA Retirees
Western Reserve Historic Society

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APPENDIX A
CULTURAL RESOURCE CORRESPONDENCE

1. Correspondence between J. Morris/Glenn Research Center Facility Preservation Officer and M. Epstein Ohio Historic Preservation Office, Regarding NASA's proposal to demolish facilities at Lewis Field in Cleveland, OH, dated May 4, 2004.

2. Press Release of the Community Awareness Meeting at Glenn Research Center, Regarding the history and potential demolition of the Altitude Wind Tunnel and Propulsion Systems Laboratory (Test Cells 1 & 2), Meeting held on April 27, 2006.

3. Correspondence between L. Main/ Glenn Research Center Facility Preservation Officer and R. Wallace/Advisory Council on Historic Preservation, Regarding ACHP determination that participation in consultation is not needed at this time, dated August 21, 2006.

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National Aeronautics and
Space Administration

John H. Glenn Research Center
Lewis Field
Cleveland, OH 44135-3191

May 4, 2004

Reply to Attn of: 7320

Mr. Mark Epstein, Department Head
Resource Protection and Review
Ohio Historic Preservation Office
567 East Hudson Street
Columbus, Ohio 43211-1030

Dear Mr. Epstein:

NASA Headquarters is encouraging the NASA Glenn Research Center in Cleveland, Ohio to demolish unutilized and deteriorated structures. This initiative is prompted by the numerous aged structures at our Center that require extensive maintenance, of which we cannot afford. The concern is that these structures will become safety hazards if their deterioration is not addressed. In response to this initiative, Glenn Research Center has identified structures and is planning for their demolition within the next few years. In order to comply with our responsibilities under the National Historic Preservation Act of 1966, I am initiating the Section 106 process. I am submitting my documentation of Steps 1 and 2 of this process for each facility for your review and consultation.

Facilities planned for demolition at the Plum Brook Station near Sandusky, Ohio include:

- Water Towers
- E-Site Dynamics Stand *
- Power House No. 1

Facilities planned for demolition at Lewis Field in Cleveland, Ohio include:

- Industrial Waste Basins 3 & 4
- Power Systems Laboratory Test Cells 1 & 2 *
- Altitude Wind Tunnel *
- Sewer Pump House Building 26
- Logistics Management Building 28

Facilities noted above with an asterisk (*) are determined by NASA to be eligible or potentially eligible for listing on the National Register of Historic Places. If you concur, these properties will subsequently be the subject of Steps 3 and 4 of the Section 106 process.

The facilities without an asterisk (*) are determined to be not eligible, and no historic properties would be affected by their demolition.

Your assistance with the review of these proposed demolition projects is appreciated.

Sincerely,

Joseph E. Morris
Facility Preservation Officer

Enclosures

cc:
7000/O. D. Gonzales-Sanabria
7300/D. Lauderdale
7320/L. M. Irvine
7400/M. J. Blotzer
8400/T. F. Kortes

7320/JEMorris:kak:4/29/04.MarkEpsteinOHPO.doc

Preserving America's Heritage

August 21, 2006

Mr. Leslie A. Main
GRC Historic Preservation Officer
National Aeronautics and Space Administration
John H. Glenn Research Center Lewis Field
Cleveland, OH 44135-3191

Attn: DFM

REF: Proposed Demolition of Research Facilities: Altitude Wind Tunnel and Propulsion Systems Laboratory (PSL 1 & 2)
Cleveland, Ohio

Dear Mr. Main:

On August 9, 2006, the ACHP received your notification and supporting documentation regarding the adverse effects of the referenced project on properties listed on and eligible for listing on the National Register of Historic Places. Based upon the information you provided, we do not believe that our participation in consultation to resolve adverse effects is needed. However, should circumstances change and you determine that our participation is required, please notify us. Pursuant to 36 CFR 800.6(b)(iv), you will need to file the final Memorandum of Agreement and related documentation at the conclusion of the consultation process. The filing of the Agreement with us is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions or require further assistance, please call Tom McCulloch at 202-606-8505, or via eMail at tmcculloch@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Office of Federal Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 809 • Washington, DC 20004
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April 24, 2006

Sally Harrington
Media Relations Office
(216)433-2037
Sally.V.Harrington@nasa.gov

RELEASE: 06-024

COMMUNITY AWARENESS MEETING AT GLENN RESEARCH CENTER

NASA's Glenn Research Center will host a community awareness meeting on the history and planned demolition of the Altitude Wind Tunnel and Propulsion Systems Laboratory 1 and 2. The meeting will take place on Thursday, April 27, at 7 p.m. in Glenn's Development Engineering Building located on the north side of Brookpark Road, west of the I-480 and Grayton Road interchange.

Community members will hear about the project and its effects on historic properties and be able to provide comments in accordance with the National Historic Preservation Act.

Glenn's Acting History Officer Anne Power will speak about the contributions the facilities have made to research and how that history will be preserved. Les Main, of Glenn's Facilities Division, will talk about the demolition project, and Trudy Kortes, environmental engineer in Glenn's Environmental Management Branch, will discuss the National Environmental Policy Act requirements. Questions and comments will be taken from the audience following the presentations in order to gain feedback on the proposed project.

The meeting is open to the public; however, access is restricted to United States citizens. All adult visitors are required to present government-issued photo identification, such as a driver's license.

Media representatives interested in attending the meeting are requested to contact Sally Harrington or the Media Relations Office at 216-433-2901.

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APPENDIX B
GENERAL CONFORMITY APPLICABILITY ANALYSIS

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APPENDIX B GENERAL CONFORMITY APPLICABILITY ANALYSIS

B.1 INTRODUCTION

The Clean Air Act (CAA) contains legislation that mandates the general conformity rule to ensure that Federal actions in non-attainment and maintenance areas do not interfere with a state's timely attainment of the National Ambient Air Quality Standards (NAAQS). The general conformity rule divides the air conformity process into two distinct areas: applicability analysis and conformity determination. The applicability analysis process requires Federal agencies to determine if their proposed action(s) would increase emissions of criteria pollutants above preset threshold levels (40 CFR §93.153). These threshold rates vary depending on severity of the non-attainment and geographic location. Section 176(c) of the CAA contains legislations for the general conformity rule and prohibits Federal agencies from conducting, supporting, or approving actions that do not conform to an approved State Implementation Plan (SIP).

The general conformity rule established this applicability and conformity determination process. Generally:

1. Determine whether a Proposed Action is specifically exempted. The demolition activities at GRC are not exempt.

2. Determine whether all or part of the Proposed Action is presumed to conform. The rule allows NASA to create special categories of actions, based on past experience, that presumptively do not result in nonconforming emissions or emissions exceeding certain threshold *de minimus* amount. *De minimus* is defined as so small as to be negligible or insignificant. If an action has less than *de minimus* emissions, a conformity determination is not required. NASA has not defined any exempt categories.

3. Determine whether the Proposed Action can be excluded as a *de minimus* project and is not regionally significant. If the action does not qualify for an exemption or presumptive category, then NASA must determine if the action can be excluded as a *de minimus* project. The agency must also determine if the action is or is not regionally significant. To find the answer to this step NASA must calculate the total actual annual direct and indirect emissions for each non-attainment pollutant resulting from the demolition activities. If the total actual emission increase in tons per year (tpy) was below the *de minimus* threshold listed in Table B-1, the action is exempted from further analysis unless it is considered regionally significant. Emissions from the Proposed Action are considered not regionally significant if the projected emissions will be less than 10% of the total non-attainment pollutant emissions published in the State Implementation Plan for the area where the action would occur. If the emissions from the demolition activities are considered *de minimus* and not regionally significant, no further analysis is required.

Table B-1 Conformity De Minimus Thresholds

Non-Attainment Area Designation	De Minimus Thresholds (tons/year)
Ozone 8-hr (Moderate)	
VOCs	50
NOx	100
Particulate Matter (PM2.5)	
Direct Emissions	100
SO_2	100
NO_x (unless determined not to be a significant precursor)	100
VOC or ammonia (if determined to be significant precursors	100
Carbon Monoxide (Maintenance)	100

B.2 *DE MINIMUS* EMISSIONS AND APPLICABILITY THRESHOLDS

De minimus emissions are total direct and indirect emissions of a criteria pollutant caused by a Federal action in a non-attainment or maintenance area at rates less than specified applicability thresholds.

The Proposed Action (demolition of facilities on GRC) would be occurring in non-attainment areas for the 8-hr ozone and the PM 2.5 standards.

The conformity applicability analysis for ozone precursors examined two aspects of the demolition activities:

- On-site demolition, loading, and vehicle activity
- Worker vehicle travel

An emissions estimate was prepared for the ozone precursors due to the non-attainment status of the Cleveland area for 8-hour ozone NAAQS standard.

Demolition activities were estimated for one year's duration and assumed that the demolition activities for both the AWT and PSL would occur simultaneously. The construction shift was assumed to be from 7:30 am to 3:30 pm daily.

B.2.1 Construction Equipment and Vehicles On-Site

The type and number of construction vehicles needed for the demolition activities were estimated. For this project (including both the AWT and PSL demolition) it is presumed that the demolition would be accomplished by a demolition contactor using heavy hydraulic shears to cut up the tunnel shell and place debris in roll-offs (large waste containers) for off-site disposal. Heavy steel scrap and concrete rubble would be put into quad-axle dump trucks for immediate removal. Additional equipment would include a large backhoe, heavy lift crane, man lifts, portable air compressors, welding and cutting equipment, jackhammers, and small hand-held

power tools (GRC 2006a). If it is deemed practicable, a concrete crusher would be used to recycle demolished concrete into usable fill; this would be in keeping with green construction practices and helps preserve landfill space.

B.2.2 Construction Employees

Only a small number of contracted workers (approximately 12 for AWT and 12 for PSL) would be involved in the demolition actions at any one time (GRC 2006a, GRC 2006b). Both locations would have a superintendent on-site during construction hours. A normal shift at the AWT site would be 7:00 am to 4:00 pm, with some weekend scheduling (GRC 2006a). A normal shift at the PSL site would be 7:00 am to 3:30 pm (GRC 2006b). Workers commuting to the project sites would generate minor increases in vehicle trips and vehicle emissions per day on GRC roadways for the life of both projects. Parking would be available at both site locations.

B.2.3 Daily Worker Commute Trips

The number of daily worker trips was estimated. Each worker was presumed to arrive in his or her own personal vehicle. It was assumed that half of the workers go off-site for lunch or to run errands. Table B-2 reflects the construction worker vehicles commutes.

TABLE B-2 EMISSIONS ESTIMATE FOR CONSTRUCTION WORKER COMMUTES

	Number of Workers	**Morning Commutes**	**Evening Commutes**	**Lunch travel**
AWT	13	13	13	6
PSL	13	13	13	6
Total	26	26	26	12

B.3 EMISSIONS ESTIMATE

The assumptions above were used to estimate the maximum yearly emissions. As shown in Table B-3, the estimates of total annual emissions from the demolition activity are 5.10, 44.91, 64.69, 5.19 and 9.73 tons per year for VOC, CO, NO_x, PM and SO_x , respectively. These amounts are less than the EPA conformity thresholds of 100 tons per year, and are also not regionally significant since the emissions are less than 10% of the basin-wide emissions.

Table B-3 Estimated Direct and Indirect Emissions

	Emissions (tons per year)				
	VOC	CO	NO_x	PM	SO_x
Construction	4.49	41.04	62.90	4.59	9.71
Debris Removal	0.30	1.54	1.48	0.58	0.01
Commuters	0.31	2.33	0.32	0.01	0.02
Total	**5.10**	**44.91**	**64.70**	**5.19**	**9.73**
De Minimis Threshold	**100**	**100**	**100**	**100**	**100**
Basin Emissions	61,909[1]	64,212[2]	83,009[1]	397.8[3]	478.3[3]
10% of Basin Emissions	**6,191**	**6,421**	**8,301**	**39.8**	**47.8**

[1] VOC and NO_x emissions estimate from 61 FR 20458 are 338.3 tons per day (tpd) and 453.6 tpd respectively over the April to October ozone season (183 days) for 2006.

[2] CO emissions estimate from 59 FR 5332 is 246.97 tpd for 1992. Annual emissions estimate assumes 260 days per year.

[3] PM and SOx emission estimates were back-calculated from VOC mobile emissions from 61 FR 20458 for 2006 assuming a VOC emission factor from EDMS 4.11 MOBILE5A using a 35 mph average speed and all system defaults.